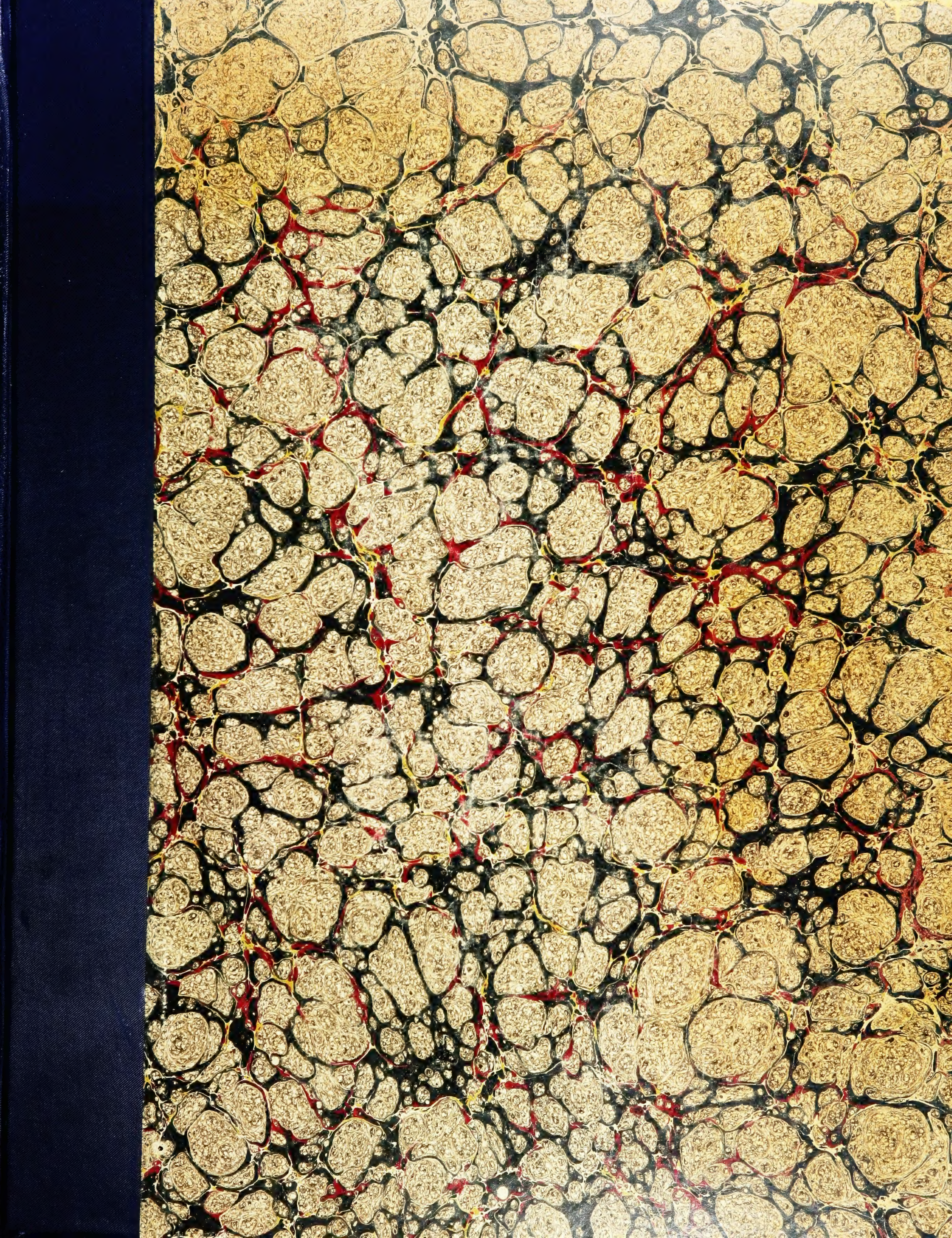

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A GENERAL CATALOGUE OF DOUBLE STARS

WITHIN 121° OF THE NORTH POLE

BY
S. W. BURNHAM

PART II.

NOTES TO THE CATALOGUE

1902

PUBLISHED BY
THE CARNEGIE INSTITUTION OF WASHINGTON
1906

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(Part Two)

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ABBREVIATIONS AND REFERENCES

A——R. G. Aitken.

His catalogues of new double stars are:

I. Nos. 1 to 47, *A. N.* 3635.
II. Nos. 48 to 109, *A. N.* 3668.
III. Nos. 110 to 203, *Bul. L. O.* No. 3.
IV. Nos. 204 to 312, *Bul. L. O.* No. 16.
V. Nos. 313 to 429, *Bul. L. O.* No. 29.
VI. Nos. 430 to 645, *Bul. L. O.* No. 50.
VII. Nos. 646 to 800, *Bul. L. O.* No. 61.
VIII. Nos. 801 to 900, *Bul. L. O.* No. 66.
IX. Nos. 901 to 1250, *Bul. L. O.* No. 93.

These stars were discovered with the 36-inch and 12-inch Clark refractors of the Lick Observatory.

All the stars in catalogues VIII and IX, and a few in VII, were received too late for insertion in Part I, and are given in the Appendix to Part I.

A. G.——Stars noted as double in the various A. G. catalogues. Only those which have been measured, or examined by some later observer are given in Part I. These are numbered in order of R. A. The double stars in A. G. Helsingfors-Gotha are given with the Kr numbers used in *Publications of the Lick Observatory*, Vol. II.

A. J.——Astronomical Journal.

A. N.——Astronomische Nachrichten.

Arabic figures in parentheses following the name of an observer, as, Do (3680), always indicate the number of the *A. N.* in which the measure is given.

Arg.——Stars noted as double in the two Oeltzen-Argelander star catalogues (+45° to +80° and −15° to −31°).

β——S. W. Burnham.

The catalogues of new double stars are:

I. Nos. 1 to 81. *Monthly Notices of the Royal Astronomical Society*, XXXIII, 351 (March 1873). Discovered with the 6-inch refractor.

II. Nos. 82 to 106. *Monthly Notices of the Royal Astronomical Society*, XXXIII, 437 (May 1873). Discovered with the 6-inch refractor.

III. Nos. 107 to 182. *Monthly Notices of the Royal Astronomical Society*, XXXIV, 59 (December 1873). Discovered with the 6-inch refractor.

IV. Nos. 183 to 229. *Monthly Notices of the Royal Astronomical Society*, XXXV, 382 (June 1874). Discovered with the 6-inch refractor.

V. Nos. 230 to 300. *Monthly Notices of the Royal Astronomical Society*, XXXV, 31 (November 1874). Nos. 230 to 252 were discovered with the 6-inch refractor; Nos. 253 to 281 with the 9.4-inch refractor of the Observatory at Dartmouth College, and Nos. 286 to 300 with the 26-inch refractor of the Naval Observatory at Washington.

VI. Nos. 301 to 390. *Astronomische Nachrichten*, No. 2062. Discovered with the 6-inch refractor.

VII. Nos. 391 to 436. *Astronomische Nachrichten*, No. 2103. Also reprinted in the *American Journal of Science* (September 1876). Discovered with the 6-inch refractor.

VIII. Nos. 437 to 452. *American Journal of Science* (July 1877). Discovered with the 18½-inch refractor of the Dearborn Observatory.

IX. Nos. 453 to 482. *Monthly Notices of the Royal Astronomical Society*, XXXVIII, 78 (December 1877). Discovered with the 6-inch refractor.

X. Nos. 483 to 733. *Memoirs of the Royal Astronomical Society*, Vol. XLIV. Discovered with the 18½-inch refractor of the Dearborn Observatory. (This volume contains also measures of 500 other double stars with the same instrument.)

XI. Nos. 734 to 775. *Report to the Trustees of the James Lick Trust of Observations made on Mt. Hamilton with reference to the Location of Lick Observatory, 1880.* Observations with the 6-inch refractor on Mt. Hamilton in 1879. There are measures of a few of the old pairs with the same instrument. (This report is reprinted in *Publications of the Lick Observatory*, Vol. I).

XII. Nos. 776 to 863. *Publications of the Washburn Observatory*, Vol. I. Observations with the 15½-inch equatorial of the Washburn Observatory, Madison, Wis., in 1881. (This volume contains also several hundred measures of other double stars.)

XIII. Nos. 864 to 1025. *Memoirs of the Royal Astronomical Society*, Vol. XLVII. Nos. 864 to 997 discovered with the 18½-inch refractor of the Dearborn Observatory; Nos. 998 to 1013 with the 12-inch of the Lick Observatory in October 1881; and Nos. 1014 to 1025 with the 18½-inch at Chicago. (This volume contains a large number of measures of Struve and other pairs.)

XIV. Nos. 1026 to 1038. *Astronomische Nachrichten*, No. 2875. Observation with the 12 and 36-inch refractors of the Lick Observatory. The numbers were inadvertently omitted, but are given in the introduction to Catalogue XV. (*Astronomische Nachrichten* 2875 also contains measures of other stars.)

XV. Nos. 1039 to 1092. *Astronomische Nachrichten*, Nos. 2929, 2930. Observations with the 36-inch refractor. (Also measures of other double stars.)

XVI. Nos. 1093 and 1154. *Astronomische Nachrichten*, Nos. 2956, 2957. Observations with the 36-inch refractor. (Also measures of other double stars.)

XVII. Nos. 1155 to 1224. *Astronomische Nachrichten*, Nos. 3047, 3048. Observations with the 36-inch refractor, and measures of other stars.

XVIII. Nos. 1225 to 1266. *Astronomische Nachrichten*, Nos. 3113, 3114. Observations with the 36-inch refractor, and measures of other stars.

XIX. Nos. 1267 to 1274. *Astronomische Nachrichten*, Nos. 3141, 3142. Observations with the 36-inch refractor. (Catalogues XIV to XIX are given in *Publications of the Lick Observatory*, Vol. II.)

XX. Nos. 1275 to 1290. *Publications of the Yerkes Observatory*, Vol. I.

XXI. Nos. 1291 to 1308. *Publications of the Yerkes Observatory*, Vol. II.

XXII. Nos. 1309 to 1336. Printed for the first time in this volume.

β^1——*Memoirs of the Royal Astronomical Society*, Vol. XLIV.

Double star observations made in 1877–78 at Chicago with the 18½-inch refractor of the Dearborn Observatory.

I. Catalogue of 251 New Double Stars.
II. Measures of 500 Double Stars.

β^2——*Report of the Trustees of the James Lick Trust of Observations made on Mt. Hamilton in 1879.*

Reprinted in *Publications of the Lick Observatory*, Vol. I.

β^3——*Memoirs of the Royal Astronomical Society*, Vol. XLVII.

Double star observations made in 1879 and 1880 with the 18½-inch refractor of the Dearborn Observatory.

I. Catalogue of 151 New Double Stars.
II. Measures of 770 New Double Stars.

β^4——*Publications of the Washburn Observatory*, Vol. I.

Measures with the 15½-inch refractor in 1882.

β^5——*Publications of the Yerkes Observatory*, Vol. II.

Measures of double stars with the 40-inch refractor of the Yerkes Observatory in 1900 and 1901.

β^6——Measures of double stars with the 40-inch refractor of the Yerkes Observatory, 1900–1906, and the results, nearly ten thousand measures, printed for the first time in this General Catalogue.

Ba (**I**)——*Astronomical Observations at the Private Observatory of J. G. Barclay*, 1862–64, Vol. I.

Volumes II, III, and IV, containing measures 1865–77, are referred to in a similar way. The measures before 1864 were made by H. Romberg, and after that time by C. G. Talmage.

Bes——Bessel. *Beobachtungen der Gegenseitigen Stellungen von 38 Doppelsternen.* (Berlin Acad., Abhand., 1833.)

Bl——*Astronomical Observations and Researches made at the Dunsink Observatory*, Third Part.

Measures by R. S. Ball for parallax.

Bl (**V**)——*Astronomical Observations and Researches made at the Dunsink Observatory*, Fifth Part.

Measures by R. S. Ball for parallax.

Big——Bigourdan. *Annales de l'Observatoire de Paris.* Observations. 1883.

BM——Beer and Madler. Double star measures *A. N.* 280.

Biesbroeck——*Annales astronomiques de l'Observatoire Royal de Belgique*, IX, nouvelle série.

Observations d'étoiles doubles et discussion des mesures, par G. Van Biesbroeck.

(This work was received after the first 2^h R. A. of Part II were in type, and hence the measures cited commence with Σ 228.)

Bp——*Astronomical Observations taken at the Observatory of George Bishop during the Years 1839–1851.*

Most of the measures are by W. R. Dawes; a few by J. R. Hind.

Bru——*Astronomical Observations and Researches made at the Dunsink Observatory*, 1868–69, First Part.

Measures by Brünnow.

Bru^2——*Astronomical Observations and Researches made at the Dunsink Observatory*, Third Part.

Measures by Brünnow.

Cin——*Publications of the Cincinnati Observatory.*

Observers: Ormond Stone, H. A. Howe, Winslow Upton, H. C. Wilson, and H. V. Egbert.

As many of the stars discovered at the Cincinnati Observatory have no original numbers, and others are identical with previously known pairs, it was considered best to renumber the stars of each observer in Part I in order of R. A.

Cin^1——No. 1. *Catalogue of 50 New Double Stars Discovered with the 11-inch Refractor of the Cincinnati Observatory*, by H. A. Howe.

Some of the stars are too far south for this catalogue.

Cin^2——No. 2. *Micrometrical Measurements of 176 Double and Triple Stars with the 11-inch Refractor of the Cincinnati Observatory*, by O. M. Mitchel.

Measures made principally in 1846–48.

Cin^3——No. 3. *Micrometrical Measurements of 166 Double and Triple Stars with the 11-inch Refractor of the Cincinnati Observatory During the Years 1875–76.*

Measures by Ormond Stone, H. A. Howe, and Winslow Upton.

Cin^4——No. 4. *Micrometrical Measurements of 517 Double and Triple Stars with the 11-inch Refractor of the Cincinnati Observatory During the Year 1877.*

Same observers as in No. 3.

Cin^5——No. 5. *Micrometrical Measurements of 1054 Double Stars with the 11-inch Refractor in 1878–79.*

Measures by Ormond Stone, H. A. Howe, and H. V. Egbert.

Cin^6——No. 6. *Micrometrical Measurements of 455 Double Stars with the 11-inch Refractor During the Year 1880.*

Observers: Same as in No. 5.

Cin^{10}——No. 10. *Micrometrical Measurements of Double Stars in 1882–86 with the 11-inch Equatorial of H. C. Wilson.*

Com——George C. Comstock.

Com (**VI**)——*Publications of the Washburn Observatory*, Vol. VI, Part 2.

Measures by George C. Comstock, 1887–89.

Com (**X**)——*Publications of the Washburn Observatory*, Vol. X, Part 1.

Measures 1892–96.

Da——W. R. Dawes.

Da¹——*Memoirs of the Royal Astronomical Society*, Vol. VIII.

Micrometrical measurements of 121 double stars during the years 1830–33.

Da²——*Memoirs of the Royal Astronomical Society*, Vol. XIX.

Micrometrical measurements of double stars, 1834–39.

Da³——*Memoirs of the Royal Astronomical Society*, Vol. XXXV.

Micrometrical measurements of double stars, 1839–65.

Da⁴——Appendix to last series of measures.

Δ——Ercole Dembowski.

Δ **(I, II)**——*Misure Micrometriche di Stelle Doppie e Multiple Fatte Negli 1852–78*, Vols. I and II.

These volumes contain the most valuable, accurate, and complete series of measures ever published. They include all the Σ and OΣ stars, and most of the early β numbers, as well as many pairs from various other lists Each pair is fully observed on several nights. The results are necessarily largely quoted in this General Catalogue.

These volumes are supposed to contain all the measures of Dembowski. Many of them originally appeared in the *Astronomische Nachrichten*, and some of the early measures in *Napoli Acad. Sci. Mem.* II, pp. 51–93, 1855–57, and these references are also given.

Do——W. A. Doberck.

His observations are principally found in the *Transactions of the Royal Irish Academy*, and various numbers of the *Astronomische Nachrichten*, which are specially cited.

Doo——Eric Doolittle.

Most of the measures are taken from *Publications of the Flower Observatory*, Vol. I, Part 3. The observations were made with the 18-inch Brashear refractor. Vol. II, was issued after the first 11ʰ R. A. of Part II was in type, but many of the measures had been received in MS form, and are credited to this volume. The measures of the Hough stars will appear in a future publication of the Flower Observatory.

Du——*Mesures micrométriques d'étoiles doubles faîtes à l'observatoire de Lund*, par N. C. Dunér Lund, 1876.

Dun——*Memoirs of the Royal Astronomical Society*, Vol. III.

Approximate places of double stars in the Southern Hemisphere, observed at Paramatta in New South Wales by James Dunlop.

En——*Messungen von 90 Doppelsternen am Sechsfüssigen Refractor*, by R. Engelmann.

Other measures by Engelmann are found in the *A. N.* and cited by number.

Eng **(II, III)**——*Observations Astronomiques faintes par B. D'Engelhardt dans son Observatoire a Dresde.* Parts **II, III.** Dresde, 1890.

Ek **(I, III)**——Encke. *Astronomische Bedbachtungen auf der Königlichen Sternwarte zu Berlin*, Vols. I, III.

Fl——*Memoirs of the Royal Astronomical Society*, Vol. XXII.

Results of micrometrical measurements of double stars made at Tarn Bank, Cumberland, 1850-53, by Isaac Fletcher.

Ferr——*Terza Serie delle Misure Micrometriche delle Stelle Doppie fatte all' Equatoriale del Collegio Romano 1872–74*, dal P. G. Stanislas Ferrari. Roma, 1875.

Flm——*Catalogue des Étoiles Doubles et Multiples en mouvement relatif certain*, par Camille Flammarion. Paris, 1878.

All the measures to 1877 of stars having relative motion are arranged in chronological order.

Giacomelli **(I)**——*Atti della Reale Accademia dei Lincei.* Serie quarta, Vol. VI. p. 164. 1890.

(First series of measures by F. Giacomelli, 1888–90.)

Giacomelli **(II)**——*Atti della Reale Accademia dei Lincei.* Serie quarta, Vol. VI, p. 276. 1890.

(Second series of measures.)

Giacomelli **(III)**——*Atti della Reale Accademia dei Lincei.* Serie quarta, Vol. VII, p. 80. 1891

(Third series of measures.)

Gl——*Memoirs of the Royal Astronomical Society*, Vol. XLII.

Measures of 484 double stars made at Crossley's Observatory, Halifax, by J. Gledhill.

Glasenapp **(I)**——*Mesures d'etoiles doubles faîtes a Hoursouf*, par S. de Glasenapp. St. Pétersbourg, 1892.

Glasenapp **(II)**——*Observations astronomiques faîtes à Abastouman* (deuxième série des mesures d'étoiles doubles). St. Pétersbourg, 1894.

Glasenapp **(III)**——*Mesures micrométriques faîtes à St. Pétersbourg et à Domkino* (troisième série des mesures d'étoiles doubles). St. Pétersbourg, 1895.

Glasenapp **(IV)**——*Mesures micrométriques d'étoiles doubles faîtes à St. Pétersbourg et à Domkino* (quatrième série des mesures d'étoiles doubles). St. Pétersbourg, 1897.

Glasenapp **(V)**——*Mesures micrométriques d'étoiles doubles faîtes à Domkino et à St. Pétersbourg* (cinquième série des mesures d'étoiles doubles). St. Pétersbourg, 1899.

𝕳——William Herschel.

The original catalogues of William Herschel were printed as follows:

First Catalogue. *Philosophical Transactions for 1782*, Vol. LXXII.
Second Catalogue. *Philosophical Transactions for 1785*, Vol. LXXV.
Third Catalogue of 145 New Double Stars. *Memoirs R. A. S.* Vol. I.

Additional notes concerning these stars will be found in *Philosophical Transactions for 1803 and 1804.*

In 1866 Sir John Herschel collected his father's discoveries and observations in one catalogue entitled: *A Synopsis of all Sir William Herschel's Micrometrical Measurements and Estimated Positions and Distances of the Double Stars described by him, together with a Catalogue of those stars in order of Right Ascension for the epoch 1880 so far as they are capable of identification.* (*Memoirs R. A. S.*, Vol. XXXV.)

This work has been generally used here, although the original catalogues have been consulted in cases of doubtful identification. Many notes and corrections to the "Synopsis" have been made, notably by Herbert Sadler (*Monthly Notices R. A. S.* XLV, 316), who carefully examined the original MSS. of Sir William Herschel, and compared them with the *Philosophical Transactions*, and the compilation in the *Memoirs R. A. S.*, and detected many errors. I had some time previous to this called attention to other mistakes and omissions (*Monthly Notices R. A. S.* XXXIII, 567; XXXIV, 98).

I have used in this catalogue the designation of these stars given by Herschel in the original catalogues referred to, and not the current number in the "Synopsis."

H——John F. W. Herschel.

I. First Catalogue (Nos. 1 to 321). *Memoirs R. A. S.* Vol. II.
II. Second Catalogue (Nos. 322 to 616). *Memoirs R. A. S.* Vol. III.
III. Third Catalogue (Nos. 617 to 1000). *Memoirs R. A. S.* Vol. III.
IV. Fourth Catalogue (Nos. 1001 to 1937). *Memoirs R. A. S.* Vol. IV.
V. Fifth Catalogue (Nos. 1938 to 3241). *Memoirs R. A. S.* Vol. VI.
VI. Sixth Catalogue (Nos. 3242 to 3346). *Memoirs R. A. S.* Vol. IX.
VII. Seventh Catalogue (Nos. 5450 to 5533). *Memoirs R. A. S.* Vol. XXXVIII.
VIII. *Results of Astronomical Observations Made During the Years 1834–38 at the Cape of Good Hope.* London, 1847 (Nos. 3347 to 5449).

H^1——*Memoirs of the Royal Astronomical Society*, Vol. V.

Micrometrical measures of 364 double stars with a 7-foot equatorial achromatic telescope, taken at Slough in the years 1828, 1829, 1830.

H^2——*Memoirs of the Royal Astronomical Society*, Vol. VIII.

Second series of micrometrical measures of double stars, chiefly performed with the 7-feet equatorial at Slough in the years 1831, 1832, and 1833.

H^3——*Results of Astronomical Observations Made During the Years 1834–38 at the Cape of Good Hope*, p. 249. London, 1847.

Micrometrical measures of double stars with the 7-foot equatorial taken at Feldhausen, Cape of Good Hope, in the years 1834, 1835, 1836, 1837, and 1838.

Hd——*Annals of the Harvard College Observatory*, Vol. XIII, Part 1.

Contains a list of new double stars (Nos. 1 to 179) with approximate places; and also measures of pairs from the catalogues of Struve, Herschel, and others. The observations were made principally by J. Winlock, C. S. Peirce, and G. M. Searle, 1866–70.

Hl——Asaph Hall.

I. *Washington Observations* 1877, Appendix VI. Observations of double stars made at the United States Naval Observatory, 1875–79, by Asaph Hall.
II. *Washington Observations* 1888, Appendix I. Observations of double stars made at the United States Naval Observatory, 1880–91, by Asaph Hall.

These measures were made with the 26-inch Clark refractor of the Naval Observatory.

Hn——Edward S. Holden.

Two lists of stars discovered with the 15½-inch of the Washburn Observatory:

Nos. 1 to 60. *Publications of the Washburn Observatory*, Vol. I, 77.
Nos. 61 to 171. *Publications of the Washburn Observatory*, Vol. II, 99.

Of the second list, four were discovered at the Caroline Island, and are too far south to be given in this catalogue.

Ho——G. W. Hough.

His discoveries with the 18½-inch refractor of the Dearborn Observatory have been published as follows:

I. Nos. 1 to 209, *A. N.* 2778–79.
II. Nos. 210 to 303, *A. N.* 2977.
III. Nos. 304 to 490, *A. N.* 3233–34.
IV. Nos. 491 to 622, *A. N.* 3557–58.

Hu——W. J. Hussey.

His catalogues of new double stars are:

I. Nos. 1 to 100, *A. J.* 480.
II. Nos. 101 to 200, *A. J.* 485.
III. Nos. 201 to 300, *A. J.* 494.
IV. Nos. 301 to 400, *Bul. L. O.* No. 12.
V. Nos. 401 to 500, *Bul. L. O.* No. 21.
VI. Nos. 501 to 600, *Bul. L. O.* No. 27.
VII. Nos. 601 to 700, *Bul. L. O.* No. 57.
VIII. Nos. 701 to 800, *Bul. L. O.* No. 65.
IX. Nos. 801 to 1000, *Bul. L. O.* No. 74.
X. Nos. 1001 to 1100, *Bul. L. O.* No. 77.
XI. Nos. 1101 to 1200, *Bul. L. O.* No. 81.

These stars were discovered with the 36-inch and 12-inch Clark refractors of the Lick Observatory.

Nos. 828 to 1200 were received too late for insertion in Part I, and are given in the Appendix to Part I.

J——W. S. Jacob, Madras Observatory.

J^1——*Memoirs of the Royal Astronomical Society*, Vol. XVI.

Double stars observed at Poonah in 1845, 1846.

J^2——*Memoirs of the Royal Astronomical Society*, Vol. XVII.

Catalogue of double stars deduced from observations made at Poonah from November 1845 to February 1848.

J^3——*Memoirs of the Royal Astronomical Society*, Vol. XXVIII.

Micrometrical measures of 120 double or multiple stars taken at the Observatory at Madras in the years 1856–58.

Je——J. Jedrzejewicz.

Mesures micrométriques des étoiles doubles à Plonsk.

These observations, made with a 6½-inch refractor, are all given in various numbers of the *A. N.*, which are cited in the references.

K——*Annalen der Sternwarte in Leiden*, Vol. III, 1872.

Measures by F. Kaiser.

Kn——*Memoirs of the Royal Astronomical Society*, Vol. XLIII.

Micrometrical measures of double stars 1860–73, by George Knott.

Kr——Stars noted as double by Krueger in A. G. Helsingfors-Gotha. The first measures of these pairs are found in *Publications of the Lick Observatory*, Vol. II. The serial numbers given there are retained here, as they have been used by later observers.

Ku——Double stars discovered by F. Kustner (*A. N.* 3821).

LM——*Publications of the Leander McCormick Observatory*, Vol. I, Part 4.

Measures of double stars with the 26-inch refractor, by F. P. Leavenworth and Frank Muller, 1885, 1886.

Lu (**I**, **II**, **III**)——*Königsberg Observations*, Vols. I, II, III, 1857–70.

Measures by E. Luther.

Lv——F. P. Leavenworth.

Lv^1——*Micrometrical Measurements of Double Stars made at the Haverford College Observatory, 1888*, under the direction of F. P. Leavenworth.

Ma——J. H. Mädler.

Ma (*F. S.* **I**, **II**)——*Untersuchungen über die Fixstern-Systeme von Dr. J. H. Mädler.* Leipzig, 1847.

A large folio volume in two parts of over 500 pages, and contains measures, etc., not found in the *Dorpat Observations.*

Ma (**IX**, **X**, etc.)——*Dorpat Observations*, Vols. IX, X, XI, XII, XIII, XV.

These volumes contain measures by Mädler at Dorpat, 1840–62.

Maw (**I**)——*Memoirs of the Royal Astronomical Society*, Vol. L.

Double star observations, 1888–91, by W. H. Maw.

Maw (**II**)——*Memoirs of the Royal Astronomical Society*, Vol. LI.

Double star observations, 1892–94, by W. H. Maw.

Maw (**III**)——*Memoirs of the Royal Astronomical Society*, Vol. LIII.

Double star observations, 1895–98, by W. H. Maw.

Maw (**IV**)——*Memoirs of the Royal Astronomical Society*, Vol. LIV.

Double star observations, 1899–1901, by W. H. Maw.

Mh——*Publications of the Cincinnati Observatory*, No. 2.

Micrometrical measurements of 176 double and triple stars, observed with the 11-inch refractor of the Cincinnati Observatory, by O. M. Mitchel. These measures were made in 1846–48. A few of these measures were first printed in Vols. I and II of Mitchel's *Sidereal Messenger*, which was issued in 8-page numbers during those years.

Mu——*Annalen der K. Sternwarte bei München*, Vol. XVII.

Measures by Lamont.

P^1——*Memoirs of the Royal Astronomical Society*, Vol. XXV.

Observations of double stars taken at Madras in 1853–56 by E. B. Powell.

P^2——*Memoirs of the Royal Astronomical Society*, Vol. XXXIII.

Second series of observations of double stars taken at Madras in 1859–62 by E. B. Powell.

Per——*Annales de l'observatoire de Nice*, Vol. II.

Measures by Perrotin, 1883–86. These measures are printed in *A. N.* 2529, 2559–60, 2684–85, and 2748–49.

Pk——*Annals of the Harvard College Observatory*, Vol. XI, Part 2.

Catalogue of magnitudes of unequal double stars.

Pl——*Astronomical Observations made at the University Observatory*, Oxford, No. 1, by W. E. Plummer.

Pt——*Publications of the Morrison Observatory*, Glasgow, Mo., No. 1.

Measures with the 12¼-inch refractor (1876–81) by C. W. Pritchett, H. S. Pritchett, and C. W. Pritchett, Jr.

Ra——*Radcliffe Observations.*

The number of the volume is given in Roman numerals.

Σ——*Stellarum Duplicium et Multiplicium Measurea Micrometricae.* Petropoli, 1837.

W. Struve's great Dorpat catalogue.

Σ^1——*Additamentum in F. G. W. Struve Mensuras Micrometricas Stellarum Duplicium.*

Contains later measures of about 45 stars.

σ——*Dorpat Observations*, Vol. III.

Catalogus 795 Stellarum duplicium.

One of Struve's early lists, given without measures, and only referred to when the stars are not included in his later catalogues.

OΣ——Otto Struve.

The *Poulkowa Catalogue of Double Stars Discovered by Otto Struve*, was printed in 1843, and a second, corrected edition in 1850, in which certain of the stars were rejected when the distance of the companion exceeded 16″.

The OΣ wide, bright stars, are designated in the same way as the Σ similar pairs which are given in the Appendices to *Mensurae Micrometricae*, by "App.," and the serial number of the catalogue.

Special attention is called to *Publications of the Lick Observatory*, Vol. V, containing measures of all the OΣ stars by Hussey, with all the published measures to about 1899 arranged in chronological order.

OΣ (IX, X)——*Poulkowa Observations*, Vols. IX, X.

Measures at Poulkowa by Otto Struve.

HΣ (XII)——*Publications de Poulkovo*, Série II, Vol. XII.

Mikrometermessungen von Doppelsternen ausgeführt am 30-zölligen refractor zu Poulkowa von Hermann Struve.

S——*Philosophical Transactions of the Royal Society*, 1826.

Observations of the apparant distances and positions of 458 double and triple stars, made in the years 1823, 1824, and 1825, by James South.

Sh——*Philosophical Transactions of the Royal Society*, 1824.

Observations of the apparent distances and positions of 380 double and triple stars, made in the years 1821, 1822, and 1823, by J. F. W. Herschel and James South.

Se——*Catalogo di 1321 Stelle Doppie Misurate col grande Equatoriale di Merz all' Osservatoris del Collegio Roma, 1856–59*, by A. Secchi.

Se^{1}——Appendix to the last work.

Se^{2}——*Serie Seconda delle Misure Micrometriche fatte all' Equatoriale di Merz del Collegio Romano, 1863–66*, by A. Secchi.

Se^{3}——*Osservazioni di Stelle Doppie, 1855–56*, by A. Secchi.

Sk——*Memoirs of the Royal Astronomical Society*, Vol. XLVI.

Third catalogue of micrometrical measures of double stars made at the Temple Observatory, Rugby, by Geo. M. Seabroke. The first two catalogues are by Wilson and Seabroke (see WS).

Sk^{2}——*Memoirs of the Royal Astronomical Society*, Vol. XLVIII.

Fourth catalogue of micrometrical measures of double stars made at the Temple Observatory, Rugby, by Geo. M. Seabroke.

Sk^{3}——*Memoirs of the Royal Astronomical Society*, Vol. L.

Fifth catalogue of micrometrical measures of double stars made at the Temple Observatory, Rugby, by Geo. M. Seabroke, A. P. Smith, and H. P. Highton.

Sk^{4}——*Memoirs of the Royal Astronomical Society*, Vol. LI.

Further measures of double stars made at the Temple Observatory, Rugby, during the years 1890–95, by Geo. M. Seabroke and H. P. Highton.

Sk^{5}——*Memoirs of the Royal Astronomical Society*, Vol. LIV.

Further measures of double stars made at the Temple Observatory, Rugby, during the years 1895–1901, by Geo. M. Seabroke, H. P. Highton, E. C. Atkinson, and R. G. K. Lempfert.

Sp——Schiaparelli.

Sp **(I)**——*Misure di alcuni Principali Stelle Doppie, 1875–82, col Refrattore di Merz del R. Osservatoris di Biera in Milano*, da G. V. Schiaparelli.

Sp **(II)**——*Osservazioni Sulle Stelle Doppie. Serie Prima comprehendente le misure di 465 systemi eseguite, col Refrattore di otto pollici di Merz, negli anni 1875–85*, da G. V. Schiaparelli.

Sp **(III)**——Unpublished measures. These are principally of the OΣ and β pairs.

T——K. J. Tarrant. Measures with 10¼-inch reflector at his private observatory near London, 1885–92. The observations are printed in *A. N.* 2866, 2898–99, 2991, 3185–86.

UL——*Publications of the Washburn Observatory*, Vol. V.

Measures of double stars with the 15½-inch refractor of the Washburn Observatory in 1886 by Milton Updegraff and Alice M. Lamb.

Wh——*Ergänzung-Heft zu den Astronomischen Nachrichten*, 1849.

Measures of double stars with the Königsberger heliometer, 1833–47, by Wichman.

Wn——A. Winnecke.

Wn **(V)**——*Astronomische Beobachtungen auf der Königlichen Sternwarte zu Berlin*, Vol. V, p. 255.

Measures by Winnecke in 1855 and 1856.

Wr——*Memoirs of the Royal Astronomical Society*, Vol. XXIX.

Catalogue of the positions and distances of 398 double stars. By Lord Wrottesley. The measures are all by Morton, Simms, and Philpott, from 1854 to 1860.

WJ——*Madras Observations*, 1848–52, first series.

Measures by Worster and Jacob.

WJ^{2}——*Madras Observations*, second series.

WS——*Memoirs of the Royal Astronomical Society*, Vol. XLII.

Catalogue of micrometrical measurements of double stars made at the Temple Observatory by J. M. Wilson and G. M. Seabroke.

WS^{2}——*Memoirs of the Royal Astronomical Society*, Vol. XLIII.

Second catalogue of micrometrical measures of double stars made at the Temple Observatory by J. M. Wilson and G. M. Seabroke.

NOTES TO GENERAL CATALOGUE

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$0^m\ 26^s$ **3. β 1155.** Discovered with the 36-inch. Apparently without change.

1898.64	91°.1	0″.42	2*n*	A
1902.92	92.9	0.59	1*n*	L

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...A (3584)...Lewis (*Mon. Not.* **LXIII**, 403)...]

1 24 **7. β 1014.** Discovered with the 18½-inch. Probably no relative change. According to Porter this star has no appreciable proper motion.

1897.94	304°.1	1″.15	3*n*	L
1898.65	337.4	1.55	2*n*	β
1902.01	356.1	1.18	1*n*	L

[β (**XIII**) ... β^3 (App) ... β (3113) ... β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... Lewis *Mon. Not.* **LIX**, 400; **LXIII**, 403) ...]

1 27 **8. Σ 3064** *rej.* The only late measures are:

1879.61	353°.9	23″.78	1*n*	Cin	7.0...10.0
1901.76	357.2	23.85	2*n*	β	7.2...10.4

[H (IV)...Cin^6...β^5]

1 28 **10. Σ 3063.** Slow retrograde motion, and probably a binary of long period.

1865.55	224°.3	1″.81	4*n*	Δ
1877.88	223.3	1.81	2*n*	β
1900.11	218.7	1.88	7*n*	Doo

[Ma (*F. S.* **I**)...Δ (I)...Δ (1573)...Sk^3...Pt...Hl (**I, II**) (*Wash. Obsns.* 1884) ...Cin^4...Cin^6...Wilson (Cin^{10})...LM...Flm...Callandreau (*Bul. Ast.* **XII**, 523)...β^1...β^2...Collins (*A. J.* 378)...Doo (*Pub. Flower Obsy.* **I**)]

1 33 **12. H 1935.** Identified and measured:

1903.80	7°.7	14″.95	2*n*	β^6	8.7...8.8

1 39 **13. See 2.** Cogshall could not see any companion in 1899 at the Lowell Observatory.

[See (*A. J.* 431)...Cogshall (*A. J.* 505)]

1 51 **14. Σ 3065** *rej.* No early measures.

1901.82	289°.1	9″.49	2*n*	β	8.6...8.7

[Boeger (*A. J.* 522)...β^5...]

1 51 **15. OΣ (App) 256.** B is Lalande 47312.

1886.28	116°.2	103″.64	4*n*	Franz

[Δ (**I**)...Franz (3080)...]

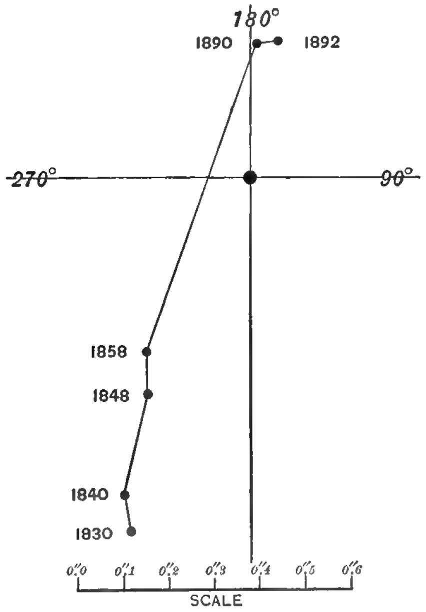
19. *a Andromedae.* **Σ 13, App. II.** (= **H̶ V. 32 = H 1937.**) $2^m\ 11^s$ The change in the position of the companion is due to the proper motion of A. Auwers gives this as 0″.200 in the direction of 141°.2. The measures of the companion by Σ, OΣ, Δ, Ho, and β give for this movement, 0″.198 in 140°.3. Spectroscopic binary (Slipher, *Astrophysical Jour.* XX, 146).

1869.25	271°.0	69″.50	5*n*	Δ
1879.72	272.1	70.27	3*n*	β
1893.88	274.0	72.20	3*n*	Ho
1903.67	275.2	73.93	4*n*	β

[Da^1...Δ (**II**) (1736)...Sk...Flm...β^3...OΣ (**X**)...Ho (3234)...Sk^5...Engelhardt (**II, III**)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...β^6...]

20. Hd 1. Examined by me in 1903; no near companion to this star. There is a 13 m, 273°.4 : 58″.2 (1903.79). No pair like Hd 1 found in the vicinity. 2 19

21. Σ 2. An interesting binary system, but the period is still uncertain, as the arc described is only about 180°, and the apparent motion is practically rectilinear. This star has a proper motion of 0″.107 in 111°.9 (Bossert). Glasenapp from measures to 1893, finds 156.62 years. Some of the positions are: 2 36



Σ 2

1840.56	338°4	0″74	3*n*	OΣ
1848.22	334.9	0.52	6*n*	OΣ
1858.50	329.3	0.44	10*n*	OΣ
1869.80	single	....	...	OΣ, β
1890.82	177.1	0.29	3*n*	β
1892.38	168.3	0.30	1*n*	β

[Ma (*F. S.* I)...Ma (**IX, XI, XIII, XV**)...Da^1. .Δ (I)...Δ (1736)...Ba (**II**)... WS...Se (*Comp. Rend.* **XLVIII**, 375)...Se^2...Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2989)...Hl (I, II)...Sk...Sk^3...Flm...β (*Knowledge*, March, 1891)...β^3...β (3048, 3141)...T (2991)...OΣ (**IX, X**, 149) ...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Glasenapp (3145)...Everett (*Mon. Not.* **LVI**, 464)...Com (*Pub. Washburn Obsy.* **X**)...HΣ (**XII**)...]

(See p. 1055)

2^m 38^s **23.** **Σ 1.** Probably without change.

1866.33	286°6	9″59	3*n*	Δ
1868.37	286.4	9.52	2*n*	Du
1904.68	287.0	9.70	2*n*	β

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...H^1...H^2...Gl...WS...Du...Δ (**II**)... β^6...]

2 43 **24.** **β** *Cassiopeiae.* **A. G. C. 15.** Discovered by Alvan G. Clark. The proper motion of the principal star is 0″550 in the direction of 110°2 (Auwers). The change shown by the later measures corresponds exactly to the movement of A.

1900.70	204°2	22″66	2*n*	β

[β (2956)...β (*Pub. L. O.* **II**)...β^5...]

2 50 **26.** **β 483.** Discovered with the 18½-inch; one of a wide pair. Probably unchanged.

1885.83	44°0	3″09	2*n*	HΣ
1891.70	44.1	2.95	3*n*	β
1898.59	42.7	3.05	2*n*	β

[β (**X**)...β^1...β (3113)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* I)...HΣ (**XII**)...]

2 51 **27.** **Arg. 1.** "Duplex" in O. Arg. N. No other measures than β^5. The components are DM (58°) 4 and 5. The A. G. positions give, 143°6 : 22″59 (1873.7).

2 57 **28.** **H 1001.** R. A. 1^m too large in H.

1901.74	77°6	15″76	2*n*	β5	8.5...9.1

3 14 **30.** κ^1 *Sculptoris.* **β 391.** Discovered with the 6-inch. The measures do not show any certain change.

1888.88	92°5	0″94	6*n*	Lv	6.1...6.1
1892.88	88.0	0.75	2*n*	Gla	6.1...6.1
1895.83	91.0	0.93	3*n*	A	...
1895.85	91.0	0.98	3*n*	Scott	...
1897.07	93.5	1.24	3*n*	See	6.4...6.4
1898.69	270.1	1.09	2*n*	Bd	7.0...7.2

[β (**VII**)...β (2103)...Cin^3...Cin^4...Lv^1...Glasenapp (**II**)...Sellors (3303, 3420) ...Scott (*Brit. Ast. Asso.*, **VI**, 368) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)... Aitken (3395)...See (3495)...Boothroyd (*A. J.* 478)...Solá (3679)...*Mon. Not.* **LXI**, 577...Do (3798)...]

3 26 **31.** **A 430.** Discovered by Aitken at Mt. Hamilton (*Bul. L. O.* No. 50).

32. **O. Stone 1.** Discovered by Stone at Cincinnati. 3^m 28^s

1887.97	108°1	9″95	1*n*	Lv
1902.85	108°4	10.1	2*n*	Scott

[Cin^5...Lv^1...Wilson (Cin^{10})...Scott (*Mon. Not.* **LXIV**, 52)]

33. **β 484.** Discovered with the 18½-inch. Without change. The following are all the later measures: 3 29

1885.74	154°7	1″90	2*n*	HΣ
1891.30	155.3	1.88	6*n*	β
1901.03	155.4	1.76	6*n*	Doo

[β (**X**)...β^1...β (3048, 3113)...β (*Pub. L. O.* **II**)...HΣ (**XII**)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...]

35. **Σ 4.** Probably fixed. 3 38

1865.39	92°4	5″14	3*n*	Δ
1899.78	93.2	5.32	6*n*	Doo
1903.76	93.7	5.24	3*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...H^2...Se...Δ (**II**)...Glasenapp (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...β^6...]

36. **H 1939.** The declination in H is 5′ too small. The correct place is given here. Some error is probable in my single distance. 3 41

1877.81	159°1	36″08	1*n*	β^1
1901.67	161.2	34.92	2*n*	β^5

37. **Σ 3.** (= **H** II. 83 = **S** 381.) H^2 observed a small star in this field, 133°0 : 4″57 : 7–8...11–12, and says "possibly the small star is mere illusion." I have never been able to see it. No change in the Σ stars. 3 49

1869.98	84°5	4.87	5*n*	Δ
1901.74	83.4	4.83	2*n*	β

[Ma (*F. S.* **I**)...Bp...Wr...Ma (**XI**)...H^1...H^2...Gl...Ra (XXII)...**Du**... Se...Sk...Sk^2...Δ (**II**)...Glasenapp (**III**)...β^5...]

38. 34 *Piscium.* **Σ 5.** (= **H** 1.) Probably unchanged. H called the small star *blue.* The proper motion of the large star is very small, 0″012 in 104°3 (Auwers). 3 51

1866.26	160°4	7″86	4*n*	Δ
1880.78	160.0	7.82	4*n*	β
1903.86	159.9	7.82	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Se (1017)...Se^3...Δ (**II**)...Glasenapp (**II**)...β^3...β^6...]

40. **Σ 6** *rej.* Measures from Harvard *Annals.* The only other measures are: 4 6

1901.67	192°7	21″11	2*n*	β5	8.9...10.5

41. **β 253.** Discovered with the 9.4-inch at the Dartmouth College Observatory. This is the *n* star of a wide pair, 38′ *n* of β *Cassiopeiae.* Change, if any, is slow. 4 8

1890.40	49°.0	0″.62	5*n*	β
1900.86	45.8	0.56	9*n*	Doo
1901.33	45.2	0.49	3*n*	A

[β (V)...β (*Mon. Not.* **XXXV**, 31)...β (2956, 3113)...β (*Pub. L. O.* **II**)...Δ (I) ...A (*Bul. L. O.* No. 11)...Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...]

$4^m 29^s$ **43.** **β 485.** The duplicity of this star was suspected at the time of finding β 253, and subsequently verified with the 18½-inch. It is one of a small triangle of stars between β 253 and β *Cassiopeiae.* Without change.

1889.55	307°.4	0″.44	3*n*	β
1891.52	307.6	0.43	2*n*	β
1892.96	305.9	0.28 ±	5*n*	Sp
1901.33	305.7	0.37	3*n*	A

[β (X)...β1...β (2956, 3113)...β (*Pub. L. O.* **II**)...Sp (**III**)...A (*Bul. L. O.* No. 11)...Bryant (*Mon. Not.* **LXII**, 383)...Doolittle (*A. J.* 547)...]

4 38 **45.** **Kr 1.** Noted as double by Krueger in *A. G. Hels.* Without change.

1898.68	190°.0	1″.95	5*n*	Doo

[β (3042)...β (*L. O.* **II**)...Bryant (*Mon. Not.* **LX**, 494; **LXI**, 486; **LXII**, 383)... Doolittle (*Pub. Flower Obsy.* **I**)...]

4 40 **46.** **H 5450.** No description in H. There is no DM star in this place, and I could not find anything that seemed likely to be the one referred to by him. Two pairs in the vicinity were measured (see Nos. 58 and 75).

5 4 **49.** **H 617.** "A third 18m at 4″: 320° suspected." Measured with the 40-inch; no third star seen.

1901.06	60°.6	13″.36	3*n*	β^5	9.2...12.7

5 5 **50.** **Hd 2.** Since the first part of this Catalogue was in type, I have looked up this pair, and find an error in the Hd place, where it is given as DM (7°) 13. It is DM (7°) 5, 7.5 m in DM, and 8.2 in A. G. (= L 47338). The place (1880) is, R. A. $0^h 2^m 39^s$; Decl. 7° 21′. Unless the single measure is erroneous, there has been a decided change in the distance. The *Paris Catalogue* gives no proper motion for this star. The following are all the measures:

1877.83	119°.6	12″.80	1*n*	β
1899.33	116.8	14.51	5*n*	Doo
1904.64	118.1	15.35	4*n*	β

[β1.. Doolittle (*Pub. Flower Obsy.* **I**)...β6...]

5 9 **51.** **Es 40.** (AC = **H 1004.**) The nearer component detected by Espin. He gives for AB:

1902°.03	316°.8	23″.50	2*n*	Es

[Espin (3784) (*Mon. Not.* **LXII**, 531)...]

5 14 **52.** **β 254.** Discovered with the 9.4-inch at the Dartmouth College Observatory. Apparently fixed

A and B

1884.76	240°.0	7″.42	6*n*	En	7.9...10.9
1893.51	235.6	7.40	3*n*	W	7.7...10.8
1898.74	237.6	7.17	2*n*	β	8.0...10.7

A and C

1893.51	240°.3	38″.16	2*n*	W	...12.2
1898.74	241.4	38.35	2*n*	β	...11.1

[β (V)...β (*Mon. Not.* **XXXV**, 31) (*Pub. Y. O.* **I**)...Δ (1)...Engelmann (2742)... Wilson ( )...]

53. **Ho 1.** Discovered with the 18½-inch. $5^m 15^s$

1893.81	172°.7	1″.06	2*n*	Ho
1903.99	170.6	1.14	1*n*	L

[Ho (2778, 3234)...Lewis (*Mon. Not.* **LXIV**, 789)...]
(See p. 1055)

54. **Σ 7.** Probably without sensible change. 5 21

1875.69	215°.9	1″.29	3*n*	Du
1894.64	216.4	1.38	1*n*	Gla

[Ma (*F. S.* **I**)...H1...H2...Ma (**XI**)...Se...Du...Δ (**II**)...Glasenapp (**III**)...]

55. **Σ 8.** *Ceti* 27. (= **H II. 55** = **Sh 361.**) No change. 5 25
One measure by Ma evidently belongs to some other pair. Both red, Sh.

1865.42	291°.8	7″.57	3*n*	Δ
1892.79	291.0	7.59	2*n*	Gla

[Ma(*F. S.* **I**)...Ma (**XI, XIII**)...Se...Pt...Δ (**II**)...Cin4...Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...]

56. **OΣ 1.** Very little if any change. One measure by 5 27
Ma (XIII) evidently belongs to OΣ 2. The principal star is given a proper motion 0″.054 in 270° (Schroeter). Whatever the movement is, it is evidently common to both stars.

1866.78	201°.7	1″.40	3*n*	Δ
1897.71	205.0	1.47	3*n*	Doo
1898.73	204.8	1.50	3*n*	Hu

[OΣ (**IX**)...Ma (**XIII**)...Δ (**I**)...Doolittle (*Pub. F. Obsy.* **I**)...Hu (*Pub. L. O.* **V**) ...HΣ (**XII**)...]

58. Measured by me in looking for H 5450 (No. 46). No 5 32
other observations.

61. **β 255.** Discovered with the 9.4-inch at the Dart- 5 38
mouth College Observatory. There is no evidence of change. This star has no appreciable proper motion.

1880.57	106°.7	0″.49	1*n*	β
1887.25	101.2	0.56	4*n*	Sp
1888.55	105.9	0.52	5*n*	HΣ
1888.98	98.4	0.48	4*n*	Sp
1890.87	97.9	0.59	3*n*	β
1897.88	99.3	0.45	3*n*	Lewis

[β (V)...β (*Mon. Not.* **XXXV**, 31)...β3...β (3048)...β (*Pub. L. O.* **II**)...Δ (**I**) ...OΣ (**X**)...Sp (**III**)...Lewis and Bowyer (*Mon. Not.* **LIX**, 400)...**HΣ** (**XII**)...]

$5^m 50^s$ **62.** **β 1026.** Discovered with the 12-inch. This star is 6.5 in DM, and 7m in L. The following are the later measures:

1900.80	336°6	0″42	2*n*	Doo
1900.85	346.8	0.26	3*n*	A
1900.90	330.0	0.33	2*n*	Bry

[β (**XIV**)...β (2875)...β (*Pub. L. O.* **II**)...Doolittle (*A. J.* 547)...Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383)...A (3638) (*Bul. L. O.* No. 11)]

(See p. 1055)

6 21 **64.** *Δ* 1. Discovered by *Δ* in 1875. No change.

1897.39	75°1	13″39	5*n*	Doo

[*Δ* (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

6 40 **66.** **Hd** 4. No near companion seen with the 40-inch, 1903.

6 40 **67.** **β 864.** Discovered with the 18½-inch. The last measure by Lewis seems to belong to another star. The following are all the measures:

1880.77	138°6	1″60	4*n*	β	8.9...12.3
1891.70	136.4	2.03	3*n*	β	8.4...11.5
1899.89	149.4	2.02	1*n*	L	8.6...11.9
1901.03	283.9	1.14	1*n*	L	8.4...11.5

[β (**XIII**)...β^3...β (3113)...β (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LX**, 494; **LXII**, 383)...]

(See p. 1055)

7 7 **69.** **H 1944.** Both stars in Yarnall and SD. Erroneously called H 1113 by Se.

1856.94	343°5	66″59	1*n*	Se	
1903.79	341.3	65.75	2*n*	β	8.0...8.5

[Se^1...H^3...β^6...]

7 11 **70.** **OΣ 2.** (AC = **H 1007.**) AB form a binary system. The angle is slowly decreasing:

1866.64	47°4	0″5	3*n*	*Δ*
1880.59	42.3	0.65	3*n*	β
1898.74	37.8	0.70	3*n*	Hu

No change in the distant star:

1866.64	225°3	17″51	3*n*	*Δ*
1880.59	225.0	17.50	3*n*	β
1898.73	225.0	18.03	4*n*	Hu

[Ma (**XI**)...Ma (**XIII**, called OΣ 1)...WJ...Se...Ba (**I**)...Du...Do (2322)...Flm ...Knorre (*Beob. Berlin,* No. 6, 1892)...Sk^3...Sk^5...Per...Per (2684, 2749) ...Burton (*Copernicus* **I**, 54)...Pt...*Δ* (**I**)...Hl (**I, II**)...T (2991)...OΣ (**IX**) ...β^3... Solá (3563)... Hu (*Pub. L. O.* **V**)... HΣ (**XII**)... Greenwich Obsy. (*Mon Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 789)...]

7 22 **71.** **OΣ (App) 1.** B is O. Arg. N. 115.

1882.83	102°4	76″87	5*n*	Franz

[*Δ* (**I**)...Franz (2649)...Schur (2255)...]

7 22 **72.** **H 618.** The only later measures are:

1901.80	250°5	5″24	2*n*	β^5	9.6...9.6

7 26 **73.** **Σ 9.** The components are DM (48°) 41 and 42. The only later measures are:

1867.34	166°3	19″58	4*n*	*Δ*
1897.52	165.2	20.31	4*n*	Doo
1902.90	166.0	19.92	2*n*	β

[Ma (*F. S.* **II**)...*Δ* (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6]

74. **β 998.** Discovered with the 12-inch. No change. $7^m 30^s$

1891.58	114°5	1″23	3*n*	β
1898.70	115.3	1.39	3*n*	Cg
1900.36	115.1	1.19	6*n*	Doo

[β (**XIII**)...β^3...β (3113)...β (*Pub. L. O.* **II**)...Cogshall (*A. J.* 478)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...]

75. Measured by me in looking for H 5450 (No. 46) which could not be found. 7 32

76. **β 1309.** (AC = **H 1006.**) The principal star of the faint pair, H 1006, was found to be double with the 40-in. Not in DM. The nearest catalogued star is DM (62°) 28 which is 255″93 distant in 89°6 (1903.68) 3*n*. 7 33

80. **Hn 1.** Discovered at the Washburn Observatory. Change in distance? 8 15

1888.57	6°9	2″57	4*n*	Com
1903.64	10.2	2.12	4*n*	β

[β^4...Com (**VI**)...β^6...]

81. **β 486.** *Ceti* 33. Discovered with the 18½-inch. Apparently fixed. This star (= L 158) is 6m in Argelander and Heis. 8 17

1879.76	6°3	3″05	2*n*	Cin	5.8...10.5
1886.86	3.4	3.31	2*n*	LM	6.0...11.5
1888.91	5.3	3.09	1*n*	β	5.0...11.0
1898.68	8.8	3.13	2*n*	Bd	5.7...11.5
1898.78	2.9	3.03	1*n*	Cg	6.0...12.0

[β (**X**)...β^1...β^3...β^4...β (2956)...β (*Pub. L. O.* **II**)...Cin^3...Cin^4...LM... Boothroyd and Cogshall (*A. J.* 478)...]

82. **Σ 11.** No change. "Very red," H (IV). 8 21

1866.44	193°3	8″02	3*n*	*Δ*
1904.70	193.5	8.04	2*n*	β

[Ma (*F. S.* **I**)...*Δ* (**II**)...Collins (*A. J.* 378)...Du...β^6...]

83. **Σ 10.** (= **S 382.**) Fixed. 8 23

1867.70	176°2	17″44	4*n*	*Δ*
1892.95	175.6	17.49	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XIII**)...Ra (**XXIII**)...Gl...*Δ* (1204)...*Δ* (**I, II**)...Glasenapp (**II**)...]

84. **Hd** 7. (= **Ho 304.**) Without change. 8 34

1891.39	6°8	7″26	2*n*	Ho	7...11.2

[Hd...Ho (3233)...]

(See p. 1055)

85. **Kr** 3. Noted as double by Krueger in *A. G. Hels.* 8 41

1898.43	44°8	3″53	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Espin (3717)... Doolittle (*Pub. Flower Obsy.* **I**)...]

8^m 44^s **86.** **β 1027.** Discovered with the 36-inch. This star is W^2 0^h. 200. Probably unchanged.

1891.85	187°.4	1″.55	3*n*	β
1895.90	180.5	1.38	1*n*	L
1897.89	180.9	1.62	3*n*	A
1902.47	187.5	1.57	2*n*	L

[β (**XIV**)...β (2875, 3113)...β (*Pub. L. O.* **II**)...A (*A. J.* 429)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LXI**, 486; **LXIII**, 403)...]

8 47 **87.** 35 *Piscium.* **Σ 12.** (= **H** III. 62 = **Sh 1.**) Relatively fixed. The principal star has a proper motion of 0″.083 in 104°.7 (Auwers).

1865.07	149°.3	11″.53	3*n*	Δ
1886.92	149.0	11.54	3*n*	Hl
1889.44	149.0	11.98	4*n*	Gla
1904.70	148.3	11.42	2*n*	β

[Ma (*F. S.* **I**)...Ma (324)...Wr...Ma (**X, XI, XIII, XV**)...Da^2...Bp...Ba (**II**)...Hd...OΣ (**IX**)...Du...Ferr...Gl...Se...Se (1017)...Se^3...H (**V**)...Δ (1011, 1473)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Hl (**II**)...Per...Per (2748)...Sp **II**)...Giacomelli (**I**)...Je (2449)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...β^6...]

8 51 **88.** **H 1008.** (BC = **Es 1.**) The later measures are:

AB	1876.67	124°.7	20″.76	2*n*	Δ	7.7...11.0
	1903.69	125.0	20.89	3*n*	β	7.9...11.2
BC	1903.70	322.7	10.00	2*n*	β	...12.7

[Δ (**I**)...Espin (3717)...β^6...]

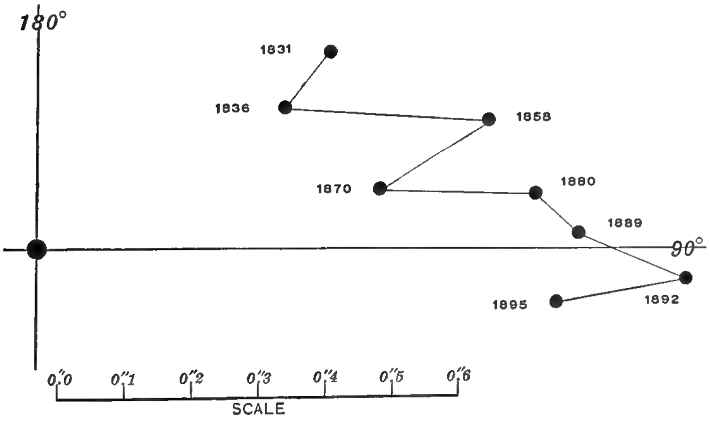
9 12 **89.** **Hd 8.** The only measures are:

1904.66	321°.0	28″.38	2*n*	β^6

In measuring this, the 7.5 m star, DM (7°) 23, which is 43^s *f*, was found to have a small companion, not noted heretofore. The place (1880) is: R. A. = 0^h 9^m 55^s; Decl. = 7° 27′.

1904.65	142°.0	6″.02	2*n*	β^6	7.7...12.2

9 25 **92.** **Σ 13.** A binary system, but the motion is very slow.



Σ13

The measures are very numerous. The following are sufficient to show the relative motion:

1831.50	124°.0	0″.53	4*n*	Σ
1836.69	119.8	0.43	3*n*	Σ
1858.50	105.9	0.70	10*n*	OΣ
1870.16	100.1	0.52	5*n*	Δ
1880.63	96.4	0.75	3*n*	β
1889.41	91.7	0.81	4*n*	β
1892.79	87.3	0.97	2*n*	Gla
1895.68	84.1	0.78	3*n*	A

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XII, XIII, XV**)...OΣ (**IX**)...OΣ (**X**, p. 149)...Δ (1100, 1185, 1473, 2077)...Δ (**I, II**)...Newcomb (*Wash. Obsns.* 1867)...H (**V**)...Collins (*A. J.* 378)...Gl...Ferr...Se...Se^2...Se (*Comp. Rend.* **XVIII**, 375)...Do (2196, 2303, 2989)...Do (*Trans. R. I. Acad.* **XXIX**, Pt. 13)...Flm...Sk...Sk^4...Sk^5...WS...WS^2...Je (2449)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...T (2898)...β^3...β (2956) (*L. O.* **II**)...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...A (*Ast. Soc. Pac.* **VII**, 305)...A (3465)...Solá (3679)...HΣ (**XII**)...Je (3802)...]

(See p. 1055)

94. **H 1946.** Probably fixed. 9^m 42^s

1869.94	56°.4	9″.37	1*n*	Hd	
1903.58	57.1	8.91	2*n*	β	9.5...10.1

[Hd...β^6...]

95. **Σ 14.** The later measures make the distance less: 9 42

1864.84	236°.4	14″.27	2*n*	Δ
1878.86	236.6	14.44	5*n*	β
1903.78	236.0	14.54	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**I**)...Flm...β^1...β^3...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

96. **Σ 15.** Relatively fixed. 9 43

1866.04	198°.6	4″.70	3*n*	Δ
1896.87	198.1	4.74	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^4...Cin^6...β^1...Glasenapp (**II**)...Hu (*A. J.* 397)...]

99. **H 1947.** The principal star has a small proper motion which appears to belong to the companion. 10 3

1879.40	74°.6	9″.36	2*n*	OΣ	6.5... 9.2
1880.73	76.2	9.05	1*n*	β	7.5...10.5
1885.71	76.1	9.25	2*n*	HΣ	
1901.82	75.3	9.10	2*n*	β	7.3...10.5

[Cin^6...β^3...OΣ (**X**, p. 123)...(*Mon. Not.* **LI**, 398)...HΣ (**XII**)...β^5...]

101. **β 487.** (AB = **Σ 17.**) The companion to B was discovered with the 18½-inch. There appears to be no change in the components of Σ 17. The following are all the other measures of BC. 10 18

B and C

1891.64	266°.5	2″.39	2*n*	β
1898.72	266.2	2.54	2*n*	β

A and B (= Σ 17)

1847.43	29°.2	26″.85	2*n*	Ma
1866.17	29.6	26.76	3*n*	Δ
1891.64	29.4	26.98	2*n*	β
1892.96	29.5	27.17	2*n*	Gla
1898.72	29.5	26.88	2*n*	β

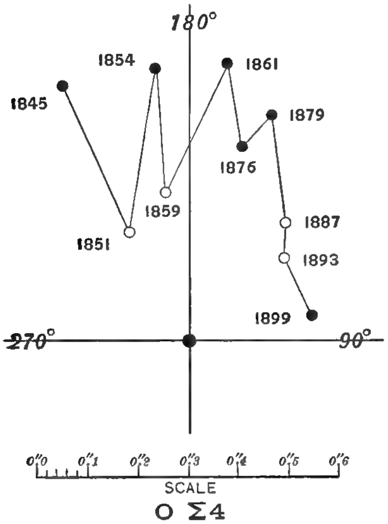
[β (X)...β^1...β (3113)...β (*Pub. L. O.* **II**)...β (*Astron. & Astro-Physics* **XIII.** 16)(*Pub. Y. O.* **I**)...Madler (*F. S.* **II**)...Herschel (*Mem. R. A. S.* **IV**)...Δ (**II**) ...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

10m 19s **102.** **Σ 16.** Without change. The components have a common proper motion of 0″.162 in 15°.8 (Bossert).

1865.60	38°.0	5″.59	3*n*	Δ
1870.67	39.0	5.59	2*n*	Du
1904.70	39.8	5.66	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Wr...Ra (**XXII**)...WS^2...Δ (**II**)...Du... Espin (*Mon. Not.* **LXII,** 528)...β^6...]

10 28 **104.** **OΣ 4.** A binary for which Glasenapp from the measures to 1887 finds a period of 135.2 years. The described arc, even at this time, is too short to give any very certain result. The total angular motion will be seen from the following positions:



O Σ4

1845.26	206°.7	0″.59	2*n*	OΣ
1851.76	209.5	0.25±	1*n*	Ma
1854.01	187.6	0.55	4*n*	OΣ
1861.66	172.7	0.56	2*n*	OΣ
1876.97	165.4	0.40	2*n*	Δ
1879.38	160.3	0.48	3*n*	β
1887.93	141.1	0.30±	1*n*	HΣ
1897.60	105.6	0.24	3*n*	A
1899.10	102.0	0.25	5*n*	Hu

[Ma (**XIII**)...Se (erroneously called OΣ 3)...Do (2322)...OΣ (**IX**)...Sk^8...Flm... Perry (*Eng. Mech.* **XXXIX,** 11)...Glasenapp (2940) (*Orbits*, etc., *in Cat. Poulkowa*)...β^1...β^3...Com (*Pub. Washburn Obsy.* **X**)...HΣ (**XII**)...β (*Pop. Ast.* **V**, 125)...A (3465)...Lewis, etc. (*Mon. Not.* **LIX,** 400; **LXI,** 486)... Hu (*Pub. L. O.* **V**)...]

(See p. 1055)

10 28 **105.** **Σ 19.** This is identical with OΣ 3, there being an error of 2^m R. A. in the Catalogue of 1843. The measures of Se of OΣ 3 should be credited to OΣ 4. Some of the measures of Σ 19 are not very accordant, but there is probably no sensible movement.

1865.10	132°.7	2″.35	2*n*	Δ
1886.92	135.4	2.28	4*n*	Hl
1898.76	133.8	2.27	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VII**)...OΣ (**IX**)...Se...Se^2...WS^2...Per... Per (2748)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Δ (**II**)...β^3...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Com (*Pub. Washburn Obsy.* **X**)... Hu (*Pub. L. O.* **V**)...Greenwich Obsy. (*Mon. Not.* **LXII,** 383; **LXIV,** 789)...]

106. **β 392.** Discovered with the 6-inch. Probably fixed. 10m 31s

1888.71	68°.2	19″.80	3*n*	β	6.5...12.3
1898.71	69.1	19.70	2*n*	β	6.1...13

[β (**VII**)...β^3...β (2103, 2875)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

107. **Hd 9.** No companion seen by Miller at the Kirkwood Observatory, 1903. Examined with the 40-inch, and a 13.5 m star, 27°.6: 55″.4 (1904.53) which may be the one referred to. There is a nearer faint star in 133°.5. 10 36

109. **Ku 4.** Noted as double in *A. G. Berlin.* 10 48

1901.84	134°.5	2″.52	2*n*	Hu	9.0...10.0

[Kustner (3821)...Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...Lewis (*Mon. Not.* **LXIV,** 789)...]

110. **Σ 18.** Probably unchanged. 10 50

1857.93	88°.8	1″.52	2*n*	Se
1867.32	87.8	1.63	3*n*	Δ
1904.70	87.2	1.15	2*n*	β

[Ma (*F. S.* **I**)...H^1...Se...Do (2989) (*Trans. R. I. Acad.* **XXIX,** Part 13)...Δ (**II**) ...β^6...]

(See p. 1055)

112. **β 776.** Discovered with the 15½-inch at the Washburn Observatory. So far no evidence of change. 10 53

1888.88	202°.0	1″.11	8.8...9.2	3*n*	Com

[β (**XII**)...β^4...Comstock (*Pub. Washburn Obsy.* **VI**)...]

(See p. 1055)

113. **Hd 10.** The measure at the Kirkwood Observatory, and my own later, show that the Hd distance is much too small. There is no question as to the identity of the star. It is closely *f* the 7.5 m star, DM (2°) 32. 11

1903.77	236°.9	32″.20	1*n*	Bulleit	
1904.53	238.8	31.33	1*n*	β^6	10...10.3

114. **Weisse 1.** Marked "duplex 4″ distance" in Weisse. Without change. 11 10

1901.84	107°.3	5″.29	2*n*	β

[Cin^6...Kustner (3821)...β^5...]

115. **Σ 20.** (= **S** 383.) No sensible change. 11 10

1864.86	231°.1	12″.00	3*n*	Δ
1903.80	232.2	11.99	2*n*	β

Ma (*F. S.* **I**)...H^1...Ra (**XXII**)...Δ (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

11m 13s **116.** 38 *Piscium.* **Σ 22.** (= **♅ II. 50 = Sh 2.**) No change since ♅. Each star has a proper motion of 0″.109 in 24°.0 (Bossert).

1867.28	237°.6	4″.32	4*n*	Δ
1886.92	236.9	4.48	3*n*	Hl
1889.44	237.2	5.04	4*n*	Gla
1904.70	237.8	4.24	2*n*	β

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...Ma (324)...P^1...P^2...Bp...Ba (**II, III**)...Hd...OΣ (**IX**)...Mh...Wr...Ra (**XXII, XXIII**)...Ferr...WS...Gl...Se...Se (1017)...Se^3...Δ (1011) (*Mem. Accad. Sci.*) (**I, II**)...Pl...Sp (**II**)...Giacomelli (**I**)...Hl (**II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...β^6...]

11 14 **117.** **Σ 21** *rej.* The only measures are:

1903.58	51°.7	7″.70	2*n*	β	9.2...9.5

[H (VII)...β^6...]

11 20 **118.** **Σ 23.** The change is due to proper motion. The measures give this movement as 0″.120 in the direction of 15°.2. The following measures are sufficient to show the motion:

1836.74	359°.7	12″.70	3*n*	Σ
1863.33	355.0	9.85	6*n*	Δ
1885.81	347.6	7.40	3*n*	Hl
1903.78	335.8	5.42	4*n*	β

The movement of the larger star from meridian positions is 0″.112 in 360° (*A. G. Nico.*).

[Ma (*F. S.* I)...Ma (**X, XV**)...Hd...WS...WS^2...Ba (**II, III**)...Wr...Bp...Da^3...Gl...Σ^1...OΣ (**IX**)...Pl...Do (2196)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Cin^4...Cin^6...Sk...Per...Per (2748)...Δ (1474)...Pt...K (1519)...Δ (**II**)...Hl (*Wash. Obsns.* 1884–85)...Wilson (Cin^{10})...OΣ (**X**, p. 149)...Hl (**I, II**)...Collins (*Proc. Haverford Coll. Obsy.* 1891–92)...β (*Ast. and A.-P.* **XIII**, 19)...Glasenapp (**III**)...Collins (*A. J.* 378)...Doolittle (*Pub. Flower Obsy.* I)...Sk^5...]

11 39 **119.** **Hd 11.** The only other measures are from the Kirkwood Observatory.

1903.79	289°.8	37″.51	1*n*	Duncan	9.2...11.3

(See p. 1055)

11 50 **121.** Noted as double in *A. G. Leipzig*, and measures from same. (See p. 1055)

12 . **123.** **Hd 12.** Faint stars about 5′ *sf* the 7.5 m star, DM (2°) 32.

1904.53	292°.9	4″.88	1*n*	β^6	10.8...11.7

12 12 **126.** **β 393.** Discovered with the 6-inch. Probably unchanged.

1890.89	16°.0	0″.71	3*n*	β	7.5...8.1
1893.91	12.9	0.59	2*n*	Sel	7 ...9
1898.68	12.7	0.69	1*n*	Cg	7.5...9.0
1898.69	10.8	0.80	1*n*	β	7.0...7.5

[β (VII)...β (2103, 3048)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* I)...Cin^4...Cin^6...Sellors (3240)...See (3495)...Cogshall (*A. J.* 478)...]

128. **Σ 24.** Without change. 12m 16s

1866.44	249°.7	5″.07	3*n*	Δ
1885.80	247°.9	5.15	3*n*	Hl
1897.74	247.5	5.21	2*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...Wr...Bp...Δ (1011)...Δ (**I, II**)...Ra (**XXIII**)...Ba (**II**)...Gl...Se...Du...Ferr...Δ (*Mem. Accad. Sci.*)...Ra (**XLVI**)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Glasenapp (**II, III**)...Chofardet (3450)...Hu (*A. J.* 427)...Solá (3563)...*Annals Toulouse Obsy.* **III**...Do (3930)...*Mon. Not.* **LXIV**, 789...]

131. 26 *Andromedae.* **OΣ 5.** No relative change, but 12 22 the components have the same proper motion, 0″.029 in 56°.4 (Auwers), and probably form a physical system.

1867.73	240°.3	5″.93	4*n*	Δ
1879.77	240.5	6.15	2*n*	β
1898.78	240.9	6.16	3*n*	Hu

[OΣ (**IX**)...Ma (**XIII**)...Δ (**I**)...β^3...Hu (*Pub. L. O.* **V**)...]

133. **H 1949.** B is O. Arg. S. 109. 12 28

1892.82	321°.8	74″.57	2*n*	Gla	7.0...7.1

[Glasenapp (**II**)...]

134. **H 1015.** Measured at Kirkwood Observatory. Double 12 29 in A. G.

1903.74	145°.9	6″.95	3*n*	Miller	9...9.5

135. **Σ 25.** Fixed relatively, but a common proper 12 30 motion of 0″.057 in 143°.0 (Battermann).

1867.24	191°.8	1″.64	4*n*	Δ
1892.90	190.7	1.91	3*n*	Gla
1903.85	192.0	1.31	1*n*	Lewis

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...Se...Du...Δ (**II**)...Glasenapp (**II**)...Lewis (*Mon. Not.* **LXIV**, 789)...]

136. **H 1951.** "Difficult." The only later observations 12 41 are:

1877.95	216°.6	24″.09	1*n*	β^1
1901.82	217.5	22.87	2*n*	β^5

137. **Kr 4.** Noted as double in the *A. G. Hels.* 12 45

1898.43	190°.2	2″.19	3*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* I)...]

141. *ι Ceti.* **H 1953.** The only measures are: 13 19

1880.31	15°.5	61″.96	2*n*	β
1900.48	16.4	63.21	3*n*	Doo
1900.66	17.0	62.87	2*n*	β

The proper motion of the principal star is very small, 0″.057 in 236°.0.

[β^1...β^3...Pk...Doolittle (*Pub. Flower Obsy.* I)...β^5...]

$13^m 44^s$ **144.** S 384. (= H V. 85.) The distance is increasing from the proper motion of A. This movement is given:

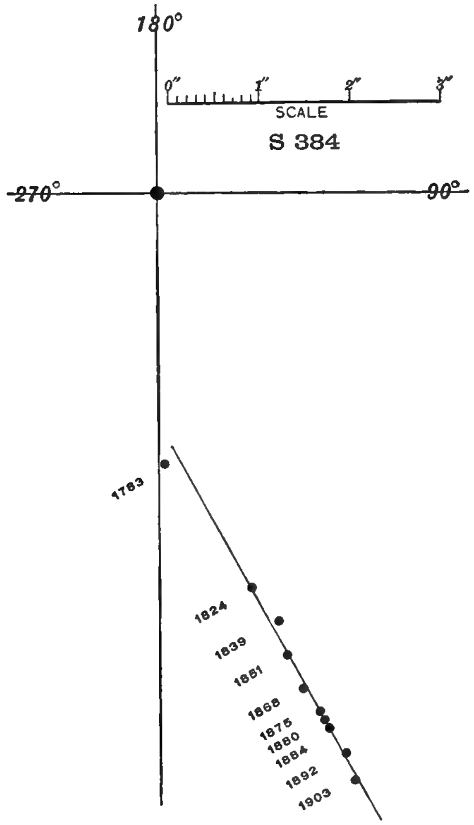
Stumpe	0″.332 in 207°.0
Porter	0.304 in 211.9

The four sets of measures by OΣ and β give:

0″.309 in 206°.1

Some of the positions are:

1783.63	....	30″.45	1*n*	H
1839.95	15°.5	49.84	1*n*	OΣ
1851.99	15.5	53.78	1*n*	OΣ
1868.80	16.0	58.73	1*n*	OΣ
1880.09	17.4	61.94	3*n*	β
1892.03	18.4	66.18	2*n*	Eng
1903.74	18.4	69.35	4*n*	β



There is a 4″ pair of faint stars in the field *p*, making a nearly equilateral triangle with A and B.

[β 2...β 3...Sk 3...Cin 6...OΣ (**X**, p. 1)...Flm...Engelhardt (**III**)...β 6...]

13 53 **146.** **β** 256. Discovered with the 9.4-inch at Dartmouth College Observatory. Evidently without change. The magnitude in SD is 8.

1878.79	249°.9	2″.43	2*n*	Cin	8.3...8.8
1886.79	248.4	2.70	2*n*	LM	8.8...9.1
1893.81	250.9	2.70	2*n*	W	9.0...9.2
1900.58	250.4	2.68	2*n*	Doo	

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (**I**)...Cin 4...Cin 6...LM...Wilson ( ) ...Boothroyd (*A. J.* 478)...Boeger (*A. J.* 522)...Doolittle (*Pub. Flower Obsy.* **I**)...]

147. **H** 1955. The only measures are: $13^m 55^s$

AB	1902.63	28°.4	50″.82	2*n*	β 6	7.3...
BC	1902.63	318.3	20.52	2*n*	β 6	11.4...11.7

148. **H** 1018. Measured at the Flower Observatory only: 14 16

1897.70	85°.3	1″.56	4*n*	Doo

149. **H** 1019. The only later measures show a possible change in the distance. 14 17

1875.86	94°.0	2″.40	4*n*	Δ	9.6...10.5
1903.69	92.6	1.68	4*n*	β	9.4...10.6

[Δ (**I**)...β 6...]

150. **β** 1015. Discovered with the 18½-inch. Probably unchanged. 14 27

1888.56	114°.8	0″.59	1*n*	Lv
1897.93	112.6	0.46	1*n*	Lewis
1897.96	125.4	0.51	2*n*	Brown
1898.86	124.0	0.48	3*n*	Bowyer
1900.36	120.2	0.55	7*n*	Doo

[β (**XIII**)...β 3 (app.)...β (3113)...β (*Pub. L. O.* **II**)...Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 494; **LXII**, 383; **LXIII**, 403)...Brown (3645)...Doolittle (*Pub. Flower Obsy.* **I**) (*A. J.* 547)...]

151. **A. C.** 1. Discovered by Alvan Clark in 1856. The distance is probably increasing. 14 35

1861.68	276°.2	0″.57	1*n*	OΣ
1874.09	281.0	0.62	4*n*	Δ
1882.62	281.8	0.97	1*n*	OΣ
1889.19	284.4	1.02	4*n*	HΣ
1900.77	282.0	1.10	2*n*	A

[Da 4...Δ (**I**)...β 3...OΣ (**X**, p. 123)...A (*Bul. L. O.* No. 11)...HΣ (**XII**)...]

152. **OΣ** 6. (AC = **Σ** 26 *rej.*) Δ gives the magnitudes, 7.2, 8.0, and 9.0. Probably no change in either companion. The principal star has a proper motion of 0″.078 in 90° (Schroeter). 14 44

		A and B		
1870.14	141°.3	0″.62	5*n*	Δ
1880.63	138.8	0.46	1*n*	β
1898.72	134.3	0.38	3*n*	Hu
		AB and C		
1867.67	113°.9	13″.28	3*n*	Δ
1880.09	113.7	13.41	2*n*	β
1898.73	114.0	13.68	3*n*	Hu

[OΣ (**IX**)...Ma (**XI, XIII**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Big...Do (2989)...β 3...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

153. **β** 1093. Discovered with the 36-inch. The *f* one of three bright stars. The measures are discordant, and change is uncertain. 14 44

1890.98	49°.1	0″.25±	3*n*	Sp
1897.92	50.0	0.40	3*n*	Lewis
1898.71	55.5	0.66	3*n*	Bd
1898.84	61.4	0.44	1*n*	β
1901.83	70.7	0.28	1*n*	Bryant
1902.88	49.6	0.38	1*n*	Lewis

[β (XVI)...β (2956)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Sp (**III**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 494; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Boothroyd (*A. J.* 478)...]

(See p. 1055)

14^m 56^s **156. β 777.** Discovered with the 15½-inch of the Washburn Observatory. Apparently fixed.

1888.32	166°2	3″98	3*n*	Com	8.7... 9.8
1891.83	166.0	4.08	3*n*	Col	8 ...10
1898.69	167.0	3.89	3*n*	Bd	8.2... 8.8

[β (XII)...β^4...Updegraff and Lamb (*Pub. Washburn Obsy.* **V**)...Comstock (*Pub. Washburn Obsy.* **VI**)...Collins (*Pub. Haverford Coll. Obsy.* 1891)...Boothroyd (*A. J.* 478)...]

15 4 **157. OΣ 7.** *Δ* found the close pair non-measurable in 1865, but there appears to be no change in angle or distance. The bright star *f* is Rad^1. 76.

A and B

1880.60	107°6	0″65	2*n*	β
1888.98	106.6	0.56	4*n*	Sp
1898.73	110.3	0.63	3*n*	Hu

A and C

1880.63	257°3	51″46	1*n*	β
1885.89	257.1	51.45	3*n*	Eng
1898.71	257.0	51.06	2*n*	Hu

AB and D

1880.63	103°0	105″15	1*n*	β

[Ma (**XI, XIII**,...*Δ* (1831)...*Δ* (**I**, p. 227)...Engelhardt (2785)...Sp (**III**)...Engelhardt (**II**)...OΣ (**IX**)(**X** p. 1)...β (2341)...β^3...Big (*Bul. Ast.* **XII**, 299)...Renz (*Bul. St. P. Acad.* 1892)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Bryant (*Mon. Not.* **LXII**, 383)...]

15 12 **158. Hd 14.** Miller at the Kirkwood Observatory could not see any companion in 1903.

15 16 **160. H 1020.** Probably without change.

1882.60	181°7	11″23	1*n*	OΣ	7.8...10.5
1897.40	180.3	11.35	5*n*	Doo	

[OΣ (**X**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...

15 36 **162. See 4.** The only other measures are:

1898.85	252°8	3″23	3*n*	Cg	8.8...11

[See (*A. J.* 431)...Cogshall (*A. J.* 506)...]

15 48 **163. H 1957.** In another observation H gives distance 5″±, and magnitudes, 8...9. This star is identical with H 3429 (*Cape Observations*), there being an error in that of 1^h R. A., and 1° Decl.

1846.75	19°2	6″29	1*n*	J	
1877.79	20.5	5.92	2*n*	Cin	7.5...8.7
1895.84	22.8	6.15	3*n*	Scott	

[WJ...J^2...Hd...Wilson (Cin^{10})...Glasenapp (**II**)...Scott (*Brit. Ast. Asso.* **VI**, 368; **VIII**, 66)...See (3495)...Scott (*Mon. Not.* **LIX**, 427)...Do (3798)...]

15 51 **164. H 3429.** In *Cape Observations* given under 1^h R. A., and corrected to 0^h. There is a further error of 1° in Decl., making it identical with H 1957. Carefully looked for, and I am certain there is no double in this place. (See No. 163.)

16^m 13^s **165. 42 *Piscium*. Σ 27.** (=H 4.) *Yellow: blue-green*, H. The change in angle and distance is due to the proper motion of the large star, which Auwers gives, 0″051 in 46°3.

1851.84	340°4	30″10	2*n*	Σ
1864.57	338.1	29.69	5*n*	*Δ*
1886.92	334.9	29.47	4*n*	Hl
1904.70	332.8	28.77	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VII**)...*Δ* (1473)...*Δ* (**II**)...Gl...OΣ (**IX**)...OΣ (**X**, p. 149)...*Pos. Med.*, p. ccxxiv...Hl (**II**)...Solá (3679)...HΣ (**XII**)...β^6]

16 18 **167. Espin 42.** Discovered by Espin.

[Espin (*Eng. Mech.* **LXXIV**, 338)(*Mon. Not.* **LXII**, 531)(*A. N.* 3784)...]

(See p. 1055)

16 45 **171. H 3362.** There is no double star in this place. There is an error of 1^h in the R. A. of H, making it identical with H 2043. (See No. 727.) The star measured by Se^1 and Se^3 and called H 3362, is really H 1964. (No. 196.)

16 49 **173. H 1022.** "Elegant." In DM 8.3m. The only measures are:

1897.53	26°8	5″78	4*n*	Doo	9...10

[Doolittle (*Pub. Flower Obsy.* **I**)...]

16 54 **174. Hd 15.** The measures at the Kirkwood Observatory are:

1903.79	273°3	27″39	1*n*	Bulleit

17 36 **178. Σ 28.** Relatively fixed.

1866.85	223°2	32″97	3*n*	*Δ*
1880.75	223.0	33.04	2*n*	β

[Ma (*F. S.* **II**)...Ma (**XIII**)...*Δ* (**II**)...β^3...*Annals Toulouse Obsy.* **III**...]

17 47 **179. Hd 16.** The only later measure is at the Kirkwood Observatory. The distances differ widely.

1903.84	290°6	58″18	1*n*	Duncan

(See p. 1055)

17 52 **181. β 488.** Discovered with the 18½-inch. Probably unchanged.

1886.74	347°2	3″40	7*n*	LM	7.6...10.9
1893.81	347.3	2.90	2*n*	W	7.2...11.0
1898.71	346.7	3.07	4*n*	Cg	7.4...10.6

[β (**X**)...β^1...LM...Glasenapp (**II**)...Wilson ( )...Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **I**)...]

18 32 **186. Hd 17.** Examined with the 40-inch, 1901, and no companion seen, and no pair of this kind found in the vicinity. Certainly some error in the Hd place.

[β^5...]

$18^{m}\ 43^{s}$ **188.** **H 1965.** Not in DM, but I find it is 348″7 in 249°6 from the 8.5m star, DM (77°) 9, giving the place of the double as adopted here.

AB	1903.80	92°5	7″73	2*n*	β^{6}	9.8...12.0
AC	1903.80	271.0	23.73	1*n*	β^{6}	...11.7

18 51 **190.** **Hn 2.** (=**Ku 5.**) The only measures since my own in 1881 are:

1901.54	331°4	2″63	2*n*	Kustner

[β^{4}...Kustner (3821)...]

18 59 **191.** **Σ 29.** (= **S 385.**) Fixed.

1868.22	167°5	4″99	4*n*	Δ
1903.72	167.5	5.03	2*n*	β

[Ma (*F. S.* **I**)...Se...Δ (**II**)...β^{6}...]

19 15 **193.** 44 *Piscium.* **OΣ 8** *rej.* Magnitudes and distance from Poulkowa Catalogue of 1840; excluded in 1850 as not double on further examination. Always single in 1865 to Δ, and Se in 1858. I found it single with the 18½-inch under favorable conditions in 1878, and Hu with the 36-inch in 1898–99 could see no elongation. Ma has a measure of it, 135°2:1″00 (1844.0) 1*n*, but this may belong to OΣ 6. Such errors are not uncommon in Ma. This star has a proper motion of 0″043 in 255°3 (Auwers).

[Ma (**XI**)...Δ (**I**, p. 227)...Se...β^{3}...Hu (*Pub. L. O.* **V**)...]

19 17 **194.** **Ho 210.** Discovered at the Dearborn Observatory by Hough.

1896.92	68°6	0″83	1*n*	Ho

[Ho (2977, 3558)...]

(See p. 1055)

19 32 **196.** **H 1964.** (= **See 8.**) "A very neat star; has a coarse double 3′ *s.*" This is erroneously called H 3362 by Se. See 8 has an error of about 5m R. A. and 10′ Decl., making it identical with H 1964.

I found it rather difficult with 6-inch, 1876. A certainly brighter than in H, about 8m. In *O. Arg. S.* it is 8–9m. The measures are not sufficient to establish motion:

1855.94	122°5	6″17	1*n*	Se	7...10
1877.70	117.1	6.56	2*n*	Cin	8...10.5
1895.93	115.7	6.60	3*n*	A	7...10
1897.73	115.3	7.08	2*n*	See	

[Se^{1}...Se^{3}...Cin^{3}...Cin^{4}...A (3395)...See (3495) (*A. J.* 431)...Cogshall (*A. J.* 505)...]

(See p. 1055)

19 40 **197.** **OΣ 9.** No certain change. Δ gives magnitudes 6.9 and 9.0. The principal star has a proper motion of 0″068 in 220°4 (Battermann). Doolittle measures a 10m star, 102°3:22″99 (1897.73) 3*n*.

1851.92	54°5	1″34	3*n*	Ma
1866.91	57.9	1.81	4*n*	Δ
1897.73	57.6	1.86	3*n*	Doo
1898.84	57.2	1.92	3*n*	Hu

[Ma (**XIII**)...Δ (1806)...Δ (**I**)...OΣ (**IX**)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...]

198. **β 489.** Discovered with the 18½-inch. No indication of motion. $19^{m}\ 40^{s}$

1891.64	180°4	3″35	2*n*	β	8.3...11.5

[β (**X**)...β^{1}...β^{3}...β (3113)...β (*Pub. L. O.* **II**)...]

200. **β 778.** Discovered with the 15½-inch of the Washburn Observatory. Motion doubtful. 19 43

1888.37	45°0	1″24	4*n*	Com
1899.92	45.4	1.19	3*n*	Doo

[β (**XII**)...β^{4}...Comstock (*Pub. Washburn Obsy.* **VI**)...Doolittle (*Pub Flower Obsy.* **I**)...]

202. **β 1156.** Discovered with the 36-inch in examining the place of Tycho Brahe's star. 19 58

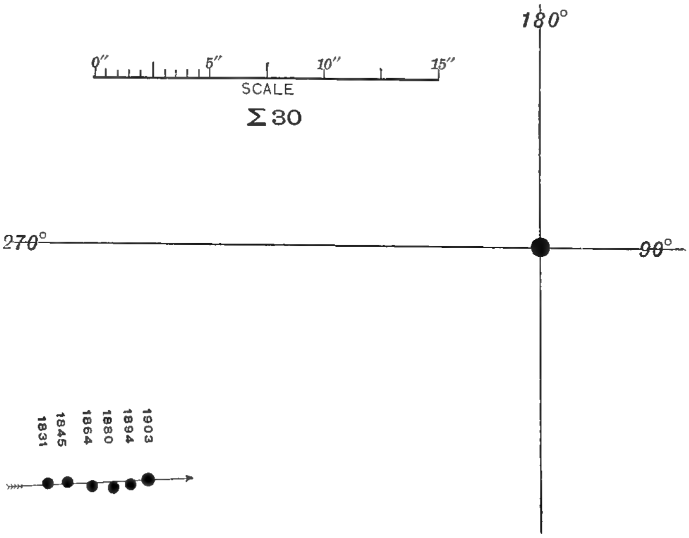
1899.57	32°0	0″54	2*n*	A
1901.75	34.5	0.45	1*n*	Bryant

[β (**XVII**)...β (3047)...β (*Sid Mess.* **IX**, 449)...β (*Pub. L. O.* **II**)...A (3638)...Bryant (*Mon. Not.* **LXII**, 383)...]

(See p. 1055)

203. **Hd 18.** The only pair found here by Miller at the Kirkwood Observatory is, 354°0:69″94 (1903.78) 1*n*. 20 :

205. **Σ 30.** *Cassiopeiae* 49. Another double star *nf*, H (V). The relative change is due to proper motion. The measures of B, assuming that star to be stationary, give for the proper motion of A, 0″054 in 268°0. 20 43



1831.21	295°.9	21″.23	3*n*	Σ
1864.85	298.4	19.70	8*n*	Δ
1880.71	299.7	19.00	2*n*	β
1892.02	300.8	18.73	2*n*	HΣ
1903.70	301.0	17.64	4*n*	β

[Ma (*F. S.* **I**)...Δ (1473)...Δ (**II**)...WS ^{2}...Sk ^{2}...Flm...Cin ^{6}...β ^{3}...Big...HΣ (**XII**)...Espin (*Mon. Not.* **LXII**, 528)...Do (3798, 3930)...Sk ^{5}...β ^{6}...]

$20^{m}\ 45^{s}$ **206.** *Schj.* 1. So described as a double star in his *Star Catalogue*, but not included in the preface list, or in *A. N.* 1485. The components are SD (6°) 71 and 72.

1877.86	27°.8	25″.00	1*n*	β
1902.63	28.1	25.02	2*n*	β

[Doolittle (*Pub. Flower Obsy.* **I**)...β ^{1}...β ^{6}...]

20 55 **208.** **β 1225.** Discovered with the 36-inch. The magnitude in DM is 7.3. The only later measures are:

1898.90	187°.5	1″.36	2*n*	Bar
1902.92	188.3	1.29	1*n*	Lewis

[β (**XVIII**)...β (3113)...β (*Pub. L. O.* **II**)...Barnard ( )...Lewis (*Mon. Not.* **LXIII**, 404)...]

21 2 **211.** **A 431.** Discovered at the Lick Observatory. (*Bul. L. O.* No. 50).

21 16 **212.** **OΣ 10** *rej.* This star was at first supposed to be a close pair, but excluded as single in the catalogue of 1850. It was always single to Δ. I found it round with the 18½-inch in 1878, and with the 36-inch in 1890. It was carefully examined by Hussey with the 36-inch in 1898 under good conditions and found to be single.

Ma has a measure, 89°.8:0″.25± (1844.0) marked "very uncertain." It is quite certain now that this star was properly rejected as single.

The distant 9m star was first measured by Δ. The distance is increasing, evidently from proper motion. The movement of A is given in A. G. as 0″.092 in 286°.2. The measures of B indicate an annual motion of about 0″.13; hence the A. G. value is too small, or the small star is moving in the opposite direction. These are all the measures:

1866.68	237°.0	96″.34	3*n*	Δ
1897.57	237.8	100.11	4*n*	Doo
1901.82	237.8	100.83	3*n*	β

[Ma (**XI**)...Δ (1806)...Δ (**I**)...β ^{3}...β (3048)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...β ^{5}...]

21 16 **213.** **Hu 507.** Discovered at Mt. Hamilton.

[Hu (*Pub. A. S. P.* **XIV**, 200)(*Bul. L. O.* No. 27)...]

21 24 **214.** **H 1966.** The estimated distance by H is much too small.

1903.61	294°.3	32″.54	2*n*	β ^{6}	8.7...11.8

$21^{m}\ 30^{s}$ **215.** **Σ 31.** Companion not seen by Δ, 1864–65. It was very plain in the 6-inch on a hazy night, 1874. It is the *np* star of a wide pair. There seems to be no change in position:

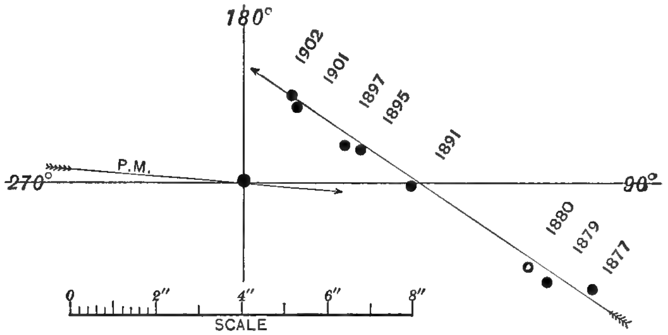
1880.05	58°.1	6″.06	1*n*	β
1904.70	57.8	5.83	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...Se...Δ (1736)...Cin ^{6}...β ^{3}...β ^{6}...]

216. **H 1968.** The change in the H components is due to the proper motion of one or both stars. The movement of A from the meridian observations is given: 21 33

Stumpe 0″.252 in 92°.1
Porter 0.276 in 85.2

I have heretofore shown from an examination of the measures of B (*Mon. Not.* LI, 108) that if this value is substantially correct, B must have a considerable proper motion of its own, thus forming a system of the class of 61 *Cygni*.



H. 1968

The following are the principal measures of the small star:

1877.23	73°.1	8″.50	4*n*	Δ
1879.87	71.9	7.46	2*n*	Cin
1880.09	73.6	6.94	3*n*	β
1891.80	89.0	3.93	3*n*	β
1895.93	106.7	2.81	3*n*	A
1897.72	107.4	2.49	3*n*	A
1901.90	145.4	2.16	3*n*	Hu
1902.63	150.8	2.35	2*n*	β

In 1891 I measured a third star, 11.7m, for an independent determination of the proper motion. This has since been measured, and after a sufficient time has elapsed, the relative movement of A should be accurately known. These measures are as follows:

A and C

1891.80	121°.3	93″.36	3*n*	β
1895.93	122.2	93.55	3*n*	A
1897.93	121.5	93.45	2*n*	A
1898.77	122.0	93.06	2*n*	A
1903.63	122.1	91.60	2*n*	β

It will be seen that the change in distance is about 0″.24 annually, and is in close agreement with the meridian observations in amount as well as in direction. It is therefore safe to say that B has considerable movement of its own. If this star was fixed in space, the proper motion of A would be about 0″30 in 45°, a value manifestly impossible, in view of the other evidence bearing upon this question.

[Δ (I)...Cin^6...β^3...β (*Mon. Not.* **LI**, 108)...β (3048, 3113)...β (*Pub. L. O.* **II**)...A (*A. J.* 429)...Glasenapp (*Proc. Russian Ast. Soc.*, Apr., 1897)... A (3395, 3638)...Doolittle (*Pub. Flower Obsy.* I)...Hu (*Bul. L. O.* No. 44) ...β^6...]

$21^m 37^s$ **217.** **β** 779. Discovered with the 15½-inch of the Washburn Observatory. Some change is probable.

1887.86	260°4	0″87	3*n*	Com
1897.75	253.6	1.18	3*n*	Doo
1903.99	253.8	0.84	1*n*	Lewis

[β (**XII**)...β^4...Comstock (*Pub. Washburn Obsy.* **VI**)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* **LXIV**, 789)...]

(See p. 1055)

21 44 **220.** **O. Stone** 2. Discovered at the Cincinnati Observatory.

1885.46	277°1	5″85	3*n*	Wilson

[Cin^4...Wilson (Cin^{10})...]

22 18 **224.** **H** 3368. In measuring H 1968 (No. 216), which is in the vicinity, I looked for this star, but could not find anything answering the description.

22 29 **225.** **Hu** 601. Discovered at Mt. Hamilton (*Bul. L. O.* No. 57).

22 30 **226.** **β** 1157. Discovered with the 12-inch; near β 1156. The magnitude is 8.0 in DM.

1897.76	81°2	1″54	3*n*	Doo
1902.71	86.9	1.73	3*n*	Doo

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* I) (*A. J.* 547)...]

22 58 **230.** **A. G.** 2. Noted "oblong" in *A. G. Lund.* I found it single with the 40-inch, 1902.55.

23 29 **236.** **β** 1094. Discovered with the 36-inch. This is a naked-eye star in *Cassiopeia.*

1897.96	246°3	0″79	3*n*	A

[β (**XVI**)...β (2956)...β (*Pub. L. O.* **II**)...A (*A. J.* 429)...]

23 31 **237.** **A** 432. Discovered by Aitken (*Bul. L. O.* No. 50).

23 36 **238.** **H** 1977. This is identical with H 3440, given in *Cape Observations* under 1^h R. A., and corrected to 0^h It is there described, 297° ± : 4″ ± : 10 = 10 (1836.7).

23 47 **239.** 28 *Andromedae.* **β** 1095. Discovered with the 36-inch. The principal star has an annual proper motion of 0″061 in the direction of 159°8, according to Auwers. The effect of this movement would decrease the position angle of B 3°8, and increase the distance 0″53 in the interval covered by the first two measures. The measures show common proper motion.

The later observations are:

1898.73	4°5	2″34	3*n*	β
1904.61	0.4	2.38	1*n*	β

[β (**XVI**)...β (2956)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* I)...β^6...]

240. **Kr** 7. Noted as double in *A. G. Hels.* $23^m 48^s$

1898.43	7°7	4″06	3*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Espin (3717)...Doolittle (*Pub. Flower Obsy.* I)...]

242. 12 *Ceti.* **H** 322. A fine pair. There are no early measures for comparison, but my last observations indicate change in distance. The large star has no appreciable proper motion. 23 55

1866.76	185°2	8″66	3*n*	Δ	6.2...11.0
1880.23	187.0	8.63	3*n*	β	6.0...11.0
1901.81	189.0	9.54	4*n*	β	
1904.70	189.8	9.65	2*n*	β	

[H (**VII**)...Δ (I)...β^3...β^5...β^6...]

(See p. 1056)

243. **β** 394. Discovered with the 6-inch. Probably unchanged. 24 16

1885.74	278°5	0″97	4*n*	HΣ
1888.68	281.5	1.08	3*n*	T
1893.54	280.1	1.06		W
1901.29	278.9	1.12	4*n*	Doo

[β (**VII**)...β (2103)...Δ (I)...Tarrant (2991)...Wilson ( )...HΣ (**XII**)... Doolittle (*A. J.* 547)...]

244. **H** 1027. Not a DM star, but in the field with DM (21°) 54. 24 16

1902.73	193°2	11″81	2*n*	β^6	9.8...9.9

245. **OΣ** 11 *rej.* Distance in catalogue of 1843 given as 4″ instead of 4′, and it was excluded in 1850. The general similarity of this and the preceding pair, H 1027, suggests the possibility of OΣ's first observation belonging to the latter, and an error of 10° Decl. in the entry. The magnitudes, however, do not correspond. 24 16

[Δ (I, p. 227)...Hu (*Pub. L. O.* V)...]

247. **β** 107. Discovered with the 6-inch. From an estimate of 2″ for the distance in 1873, and the measures of 1891, which now appear to be too small in distance, it appeared that there was some change, presumably from proper motion. The later observations do not confirm this. 24 31

1898.72	354°0	5″67	3*n*	β
1899.82	354.8	5.78	2*n*	Bar
1900.71	354.0	5.70	2*n*	β
1902.87	354.1	5.63	3*n*	β

I have heretofore shown that this group of DM stars, of which the double is one, occupy different relative positions in the sky from the catalogue places. With a view of ascertaining whether the apparent change is real, or due to errors in the meridian observations, I have connected four of them with A of β 107.

A and C

1898.73	336°2	46″95	2*n*	β	...8.2
1899.82	336.7	46.83	2*n*	Bar	
1900.71	336.7	46.78	2*n*	β	
1902.89	336.3	46.70	2*n*	β	

A and D

1898.73	146°6	50″27	2*n*	β	...8.3
1899.82	146.6	50.30	2*n*	Bar	
1900.71	146.6	50.32	2*n*	β	

A and E

1898.76	171°2	113″78	1*n*	β	...8.5
1899.82	171.0	113.48	2*n*	Bar	
1900.71	170.9	113.55	2*n*	β	

A and F

1898.76	113°9	150″44	1*n*	β	...8.7
1899.82	113.8	150.32	2*n*	Bar	
1900.71	113.9	150.49	2*n*	β	

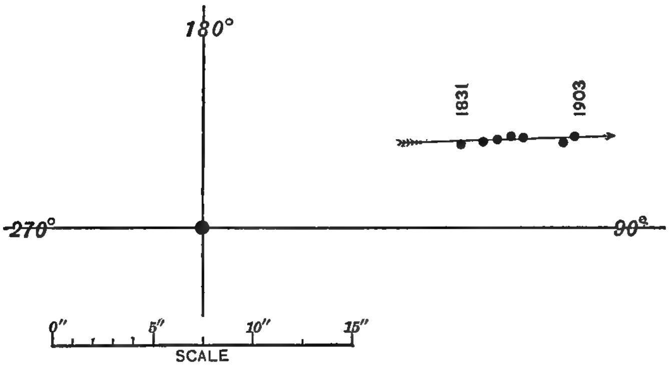
E and *e*

1900.72	139°1	8″61	1*n*	β	...16

[β(**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3113)(*Pub. L. O.* **II**)(*Pop. Ast.* **VII**, 1)...β^5...β^6...Kreutz (3652)...Doolittle (*A. J.* 547)...β (*Pub. Y. O.* **I**)...]

24^m 33^s **248.** 49 *Piscium.* **Σ 32.** A perspective pair, the change being due to proper motion. The values of the proper motion of A as derived from the meridian observations, and that from the measures of B by Σ, Δ, and β are:

Auwers	0″069 in 288°6
Measures	0.079 in 273.3



49 Piscium. Σ32

Some of the measures are:

1829.24	108°3	13″43	2*n*	Σ
1864.78	106.6	16.28	5*n*	Δ
1869.91	105.8	16.73	3*n*	OΣ
1887.81	104.4	18.12	2*n*	HΣ
1903.76	103.6	19.28	5*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...H (**V**)...WS...Sk^2...Gl...Flm...OΣ (**IX**)...HΣ (**XII**)...Δ (1473)...Δ (**II**)...Sk^5...β^6...]

249. **Σ 33.** Relatively fixed. 24^m 36^s

1866.66	26°3	2″50	3*n*	Δ
1883.86	26.3	2.65	2*n*	Per
1899.13	29.8	2.93	1*n*	Knorre

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...H (**VII**)...Se...WS^2...Du...Per...Per (2684)...Δ (**I**)...β^3...Knorre (3632)...]

254. **β 1158.** (AB = **H 1981.**) The wide pair constitutes the double star, H 1981. The duplicity of the companion was detected with the 36-inch. H gave the angle 84°8, and the estimated distance 60″, with magnitudes 8 and 9. The magnitude of the smaller star in SD is 8.6. The magnitudes assigned to A cover a wide range: Lalande and Schjellerup, 8; Cordoba, 7½; Schönfeld, 7.2; Heis, 6–7. 24 55

The later measures are:

A and BC (= H 1981)

1898.74	86°5	78″86	7.0...	2*n*	β

B and C

1898.76	146°7	0″43	1*n*	β
1901.28	149.2	0.38	2*n*	A
1902.81	150.1	0.41	3*n*	Doo

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...H (*Mem. R. A. S.* **VI**)...A (*Bul. L. O.* No. 11)...Doolittle (*A. J.* 547)...]

255. **β 1226.** Discovered with the 36-inch. 24 58

1899.57	187°6	0″34	3*n*	A
1899.85	191.3	0.33	2*n*	Bar

[β (**XVIII**)...β (3113)...β (*Pub. L. O.* **II**)...A (3638)...Barnard ( )...]

256. **Σ 34.** No change. 24 59

1868.55	336°0	5″91	4*n*	Δ
1893.00	336.0	5.90	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X**)...H (**V**)...Du...Δ (**II**)...Glasenapp (**II**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

258. **H 5451.** (= **OΣ (App) 2.**) 6 m in *B. A. C.* 25 3

1875.48	85°3	56″29	3*n*	Δ	5.7...8.5
1888.25	84.9	55.55	5*n*	Franz	
1903.74	84.9	55.94	3*n*	β	

[Δ (**I**)...Franz (3080)...β^6...]

259. **H 5452.** Not in DM. It is 156″2 in 185°1 from A of H 5451. 25 4

1903.72	309°7	14″59	2*n*	β^6	10.9...11.4

260. λ *Cassiopeiae.* **OΣ 12.** Binary of long period. The angle is very slowly increasing. This star is given a proper motion of 0″072 in 137°4 (*A. G. Harvard*). 25 9

1852.33	130°1	0″50	3*n*	OΣ
1874.33	136.5	0.56	7*n*	Δ
1880.59	144.6	0.47	2*n*	β
1887.33	146.9	0.45	3*n*	T
1890.29	145.9	0.52	4*n*	HΣ
1898.60	152.1	0.56	4*n*	Hu

[Ma (**XIII**)...Da^3...Se...WS^2...Sk^2...Δ (1100, 1806, 2193)...Δ (I)...Perry (*Eng. Mech.* **XXXIX**, 11)...Flm...Je (2449)...OΣ (**IX**)...Du...En (2678)...Hl (*Wash. Obsns.* 1885)...Hl (**I**, **II**)...Sp (**III**)...β^3...T (2899)...Glasenapp (**II**)...HΣ (**XII**)...Big (*Bul. Ast.* **XII**, 299)...Hu (*A. J.* 397)...Greenwich Obsy. (*Mon. Not.* **LX**, 494; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 789)...Do (3680)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1056)

25^m 25^s **261.** **H 1980.** Apparently without change.

1879.78	122°8	6″03	2*n*	Cin
1899.70	122.1	6.05	2*n*	Hu

[Cin^6...Ho (3234)...Hu (*Bul. L. O.* No. 44)...]

25 26 **262.** **OΣ 13.** No change in the OΣ companion.

1868.99	131°6	6″34	4*n*	Δ
1878.87	131.6	6.36	2*n*	β
1898.78	131.7	6.52	3*n*	Hu

The more distant companions, C and D, are not in the *Pulkowa Catalogue.*

AC	1899.92	163°7	29″34	1*n*	Hu
AD	1878.87	180.0	41.25	2*n*	β

[OΣ (**IX**)...Δ (1806)...Δ (I)...Sk^3...β^3...Hu (*Pub. L. O.* **V**)...]

(See p. 1056)

25 26 **263.** **H 1030.** H says "a very minute star 14m at 275°, quite close, very strongly suspected." There is no pair in this place. There is an error of 5m in H's R. A., making it identical with π *Andromedae* (= H V. 17) which see (No. 329).

25 29 **264.** **Σ 35.** Change is not certain. The measures are not very accordant in distance, but probably fixed.

1868.25	267°5	7″88	4*n*	Δ
1877.95	266.6	8.62	1*n*	β
1892.89	266.1	7.95	2*n*	Gla
1895.92	266.8	8.55	3*n*	A
1903.81	266.6	8.29	3*n*	β

[Ma (*F. S.* **I**)...Δ (1735, 1800)...Δ (**II**)...Flm...Pt...Sk^2...β^1...Glasenapp (**II**)...A (3395)...*Annals Toulouse Obsy.* **III**...Sk^5...β^6...]

25 38 **265.** **S 386.** Both stars in the A. G. The later measures and the A. G. positions give:

1880.0	197°2	42″70	..	A. G. Camb.	
1897.58	196.3	42.68	4*n*	Doo	9...9
1904.60	196.1	42.30	2*n*	β	8.6...8.6

[Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

25 41 **266.** **Ho 2.** Discovered by Hough at the Dearborn Observatory. A 12m star 270°: 30″.

1893.86	100°3	2″26	1*n*	Ho

[Ho (2778, 3234)...]

(See p. 1056)

25 41 **267.** **β 1227.** Discovered with the 36-inch. Two distant stars added by Aitken.

AB	1897.04	202°9	2″67	3*n*	A	...11.5
AC	1897.05	87.2	22.27	2*n*	A	...11.5
AD	1897.05	116.6	32.69	2*n*	A	...12

[β (**XVIII**)...β (3113)...β (*Pub L. O.* **II**)...A (3465)...]

(See p. 1056)

268. **H 3373.** There is an error of 1^h R. A. in this place from *Cape Observations.* This pair is really identical with H 2052. (See No. 796.) 25^m 52^s

269. **Espin —.** Found by Espin (*A. and A. P.* XII, 282) (*Brit. Ast. Asso.* III, 227). 26 :

270. **A 111.** The principal star has a proper motion of 0″38 in 99° (Porter). 26 0

[A (3741) (*Bul. L. O.* No. 3)...]

271. **β 780.** Discovered with the 1 ½-inch at the Washburn Observatory. 26 0

1888.52	143°6	2″46	5*n*	Com
1902.71	141.3	2.70	2*n*	Doo

[β (**XIII**)...β^3...β^4...Updegraff and Lamb (*Pub. Washburn Obsy.* **V**)...Comstock (*Pub. Washburn Obsy.* **VI**)...Doolittle (*A. J.* 547)...]

273. **Σ 37.** Fixed. 26 7

1866.28	244°9	5″50	3*n*	Δ
1893.74	245.9	5.61	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**, **XIII**)...Δ (**II**)...Glasenapp (**III**)...*A. G. Leipzig*, p. 206...*Annals Toulouse Obsy.* **III**...]

274. 51 *Piscium.* **Σ 36.** (= **H IV. 70 = Sh 3.**) A nearer star suspected by me in 1881 with the 18½-inch, but not subsequently verified. Relatively fixed. 26 12

1865.08	82°6	27″68	3*n*	Δ
1880.64	82.2	27.45	3*n*	β
1893.74	82.2	27.74	2*n*	Gla

The proper motion of this star is very small, 0″025 in 28°5.

[Ma (*F. S.* **I**)...Ma (**X**, **XII**, **XIII**, **XV**)...En...En (1673)...Bp...Hd...Se^1...Ra (**XXI**)...Gl...WS...Sk^2...En (1518)...Δ (**II**)...Hl (**II**)...β^3...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Do (3930)...Coleman (*Mem. R. A. S.* **LIV**)...]

275. 52 *Piscium.* **H 1982.** The change in distance is apparently due to proper motion of A, 0″121 in 109°3 (Auwers). 26 18

1879.99	305°7	38″30	3*n*	β^3	...11.4
1900.68	304.2	41.18	2*n*	β^5	...12

276. **β 1310.** Discovered with the 40-inch. No other measures. This star has a proper motion of 0″205 in 86°6 (Stumpe). After a short interval it will be readily seen whether or not the companions share in this movement. 26 21

(See p. 1056)

279. **OΣ 14.** (= **H N. 76.**) No measures in H; given as Cl. I–II. Unchanged. 26 29

1866.90	160°0	8″68	3*n*	Δ
1898.79	160.2	8.83	4*n*	Hu

[OΣ (**IX**)...Δ (1806)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

26^m 35^s **280.** A. G. 3. Double in *A. G. Camb.* Measures by Miller at Kirkwood Observatory.

26 38 **281.** H 1033. "In a cluster of 8th class."

1880.59	223°2	6″84	1*n*	β	10...10
1897.71	221.5	7.52	3*n*	Doo	

[β^3...Doolittle (*Pub. Flower Obsy.* **I**)...]

26 40 **282.** H 3442. H gives the R. A. of this pair 1^h more in *Cape Observations*. There is no pair in that place. I found it in the place given here in 1876 as described by H. The magnitude in *Cord. DM* is 6.9.

1902.96	203°0	25″62	3*n*	β^6	6.6...10.5

27 3 **283.** Ho 3. Discovered at the Dearborn Observatory. No later measures.

[Ho (2778, 3558)...] (See p. 1056)

27 34 **289.** H 1034. As in most stars of this class, the distance in H is much underestimated.

1897.73	266°1	4″84	3*n*	Doo

[Doolittle (*Pub. Flower Obsy.* **I**)...]

27 38 **291.** H 3377. Both stars in *Cordoba G. C.*

1882.76	57°4	18″37	1*n*	Wilson
1897.73	56.4	19.10	1*n*	See

[Wilson (Cin^{10})...See (3495)...Scott (*Mon. Not.* **LXIV**, 52)...]

27 43 **292.** β 108. Discovered with the 6-inch. No evidence of change.

1876.76	358°3	4″17	1*n*	OΣ	8.0... 9.5
1885.69	357.8	4.40	2*n*	HΣ	
1888.68	359.0	4.28	3*n*	T	
1898.69	358.1	4.30	1*n*	β	7.0...10.5
1900.59	358.2	4.24	3*n*	Doo	

The 40-inch shows four faint stars. The single settings are:

337°8 : 20″87 15m
213.6 : 24.06 13m
150.8 : 27.25 14m
218.9 : 41.75 10m

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (I)...OΣ (**X**)...Tarrant (2991)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

27 44 **293.** Hd 22. Suspected close pair at the Harvard Observatory. Miller found it single at the Kirkwood Observatory in 1903.

27 45 **294.** A 433. Discovered at Mt. Hamilton (*Bul. L O.* No. 50).

298. Δ 2. (AC = Σ 39 = H IV. 76.) The principal star is P 0^h. 113. The close pair was discovered by Δ in 1867, but it had been previously detected by Se in 1858. There is no change in the Σ star, and probably none in the close pair. 28^m 22^s

A and B

1858.04	237°0	0″4	1*n*	Se	
1877.82	241.8	0.89	1*n*	β	
1886.73	242.8	0.78	6*n*	LM	
1900.72	68.3	0.70	3*n*	A	7.7...8.1
1900.79	244.2	0.75	2*n*	Doo	7.0...9.0

AB and C

1867.52	45°7	19″85	4*n*	Δ
1892.86	45.5	19.75	2*n*	Gla
1900.79	44.3	19.47	2*n*	Doo

[Ma (*F. S.* **II**)...Bp...Ra (**XXI**)...En...Δ (1735)...Δ (**II**)...LM...Se^1...β^1 ...Glasenapp (**II**)...Solá (3563)...A (*Bul L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...]

299. Hd 23. The only later measure is at the Kirkwood Observatory. 28 28

1903.79	134°0	24″93	1*n*	Miller

301. A. G. 4. Noted "very close double?" in *A. G. Camb.* Single at the Kirkwood Observatory 1903.77. 28 35

302. S 387. About 90″ distant in the direction of 68°, there is a pair of small stars, 160° : 2½″. 28 37

1881.65	232°6	42″23	3*n*	β^4	8.4...8.4
1904.69	232.7	42.03	2*n*	β^6	8.5...8.5

303. Σ 41. Without change. 28 38

1866.39	188°4	15″63	3*n*	Δ
1904.68	188.4	15.85	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XII**, **XIII**)...WS...Gl...Δ (**II**)...β^6...]

304. Σ 38. Probably unchanged. 28 41

1864.38	144°4	16″94	3*n*	Δ
1904.06	145.4	17.25	1*n*	Es

[H (**IV**)...Ma (*F. S.* **I**)...Δ (**II**)...Espin (*Mon. Not.* **LXIV**, 676)...]

305. Σ 40. Fixed. 28 44

1866.30	312°4	11″66	4*n*	Δ
1892.70	314.2	11.46	1*n*	Maw
1904.68	312.6	11.71	1*n*	β

[Ma (*F. S.* **I**)...H^1...Ra (**XXII**)...Wr...Du...Δ (**II**)...Maw (**II**)...β^6...]

308. β 1291. Discovered with the 40-inch (β^5). 28 56

309. Hn 61. Discovered by Holden at the Washburn Observatory. No other measures. 28 57

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

28^{m} 58^{s} **310.** A. G. 5. Noted as double in *A. G. Lund.* I found it single with the 40-inch, 1902.55.

29 **311.** **Hd** 25. Measured at the Kirkwood Observatory.

1903.79	340°1	23″11	2*n*	Miller

29 4 **314.** 13 *Ceti.* **Ho** 212. (AC = **β** 490.) In 1887 Hough with the 18½-inch found that the principal star was a very close pair. In 1890 and 1891 I could not see any elongation with the 36-inch, and it was not seen as a close pair until several years later. It is undoubtedly binary, and may have a short period. All the measures are given below.

The faint companion was noted with the 18½-inch. The principal star has a proper motion of 0″397 in the direction of 93°0 (Auwers). This movement fully accounts for the change in the position of the companion as shown by the measures. The minimum distance of 18″ will be reached about 1962. My first distance in 1877 was erroneously printed 37″12.

		A and B			
1887.81	93°4	0″3±	1*n*	Ho	
1890–91	single	....	..	β	
1899.97	250.7	0.28	2*n*	See	
1900.70	261.0	0.21	3*n*	A	5.5...6.2
1901.77	272.2	0.31	2*n*	A	
		AB and C			
1877.78	65°3	38″12	1*n*	β	
1887.81	60.8	35.63	1*n*	Ho	
1891.61	58.9	33.72	3*n*	β	
1898.56	57.8	31.28	2*n*	β	
1899.77	55.2	31.09	3*n*	Doo	
1900.65	56.9	30.13	1*n*	A	
1902.91	53.6	29.78	4*n*	β	

The measures of the distant companion give substantially the same proper motion of A as that found from the meridian positions. These results are:

Auwers	0″397 in 93°0
Measures of C	0.424 in 94.3

[β (**X**)...β1...β (3048, 3113)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Ho (2977)... See (3636)...Doolittle (*Pub. Flower Obsy.* **I**)...A (*Pub. A. S. P.* **XV**, 217) (*Bul. L. O.* No. 11)...β6...]

(See p. 1056)

29 12 **316.** **H** 1986. (= **OΣ (App) 3.**) The only measures are:

1875.79	57°5	40″00	3*n*	Δ	7.0...7.5
1882.76	57.2	40.12	4*n*	Franz	7.4...7.7

[Δ (**I**)...Franz (2649)...]

29 14 **317.** **OΣ** 15. From *Poulkowa Catalogue* of 1850. The elongation was very doubtful to Δ 1865.7. Ma has, 97°3 : 0″3 (1851.7), and "single" 1852.8. I could see no certain elongation with the Hanover 9.4-inch in 1874, and it appeared single in the 18½-inch, 1879. This star is not given in the measures of OΣ (IX). Until it was examined with the 36-inch it did not seem probable that it was really double. The large refractor showed that it was a very close pair, with about one magnitude difference in the components. These are the principle measures:

1890.88	301°6	0″15	3*n*	β	7.3...8.3
1891.71	302.1	0.14	3*n*	β	
1898.64	301.4	0.22	3*n*	Hu	
1901.20	315.9	0.16	2*n*	Bryant	

[Ma (**XIII**)...Δ (**I**, p. 227)...β3...β (3017, 3048, 3113)...β (*Pub. L. O.* **II**)... Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383)...Hu (*Pub. L. O.* **V**)...]

(See p. 1056)

318. **H** 625. The only measures are: 29^{m} 15^{s}

1903.88	284°2	15″19	1*n*	β6	9.5...13

319. A. G. 6. From *A. G. Leipzig.* 29 16

1902.84	10°3	59″44	3*n*	Miller

320. **H** 1038. "In contact with 160; just separated with 240," H. Readily seen with the 6-inch, 1876. Not in the DM. 29 19

1901.97	110°1	3″79	2*n*	β5	10.7...10.8

322. **Σ** 42. (= **S** 388.) There is not much relative change, but the components have a common proper motion of 0″449 in the direction of 159°8 (Porter), and therefore undoubtedly form a physical system. 29 38

1853.48	31°6	5″69	3*n*	OΣ
1868.68	32.3	5.51	4*n*	Δ
1895.92	28.3	5.56	1*n*	Gla
1904.69	29.2	5.75	3*n*	β

There is a third star, 10.8 m, not measured by Σ, which is not connected with AB.

1854.32	184°7	52″75	2*n*	OΣ
1861.75	186.5	49.91	1*n*	OΣ
1887.00	194.9	40.60	4*n*	Eng
1895.96	199.0	38.17	3*n*	A
1904.71	203.6	34.95	2*n*	β

The measures of OΣ and β give for the proper motion of A, 0″449 in 165°8.

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VII**)...Wr...Δ (**II**)...Engelhardt (2785) (**II**)...Se...OΣ (**IX**)(**X**, pp. 1, 150)...A (3395)...Glasenapp (**IV**)...β6...]

324. **β** 1096. Discovered with the 36-inch. The close pair is a difficult object. 29 46

		A and B		
1899.57	266°7	0″19	3*n*	A
		AB and C		
1898.77	61°7	33″93	2*n*	β
1899.76	61.6	33.78	2*n*	Bar

[β (**XVI**)...β (2956)...β (*Pub. L. O.* **II**)...A (3638)...Barnard ( )...]

325. **Σ** 43. Probably fixed. 29 59

1865.65	167°9	4″50	3*n*	Δ
1904.68	166.6	4.72	2*n*	β

[H (**IV**)...Ma (*F. S.* **I**)...Δ (**II**)...β6...]

30^{m} $:^{s}$ **326.** **Espin —.** Discovered by Espin (*A. and A. P.* XII, 282) (*Brit. Ast. Ass'n*, III, 227).

30 28 **329.** *π Andromedae* **H** V. 17. (= **Sh** 4 = **OΣ** (**App**) 4.) This is also H 1030, there being an error of 5^{m} R. A. in that pair (see No. 263). Very little if any change. This star is given a proper motion of 0″.010 in 187°.2 (Auwers). This is a spectroscopic binary (Frost and Adams, *Astrophys. Jour.* XVIII, 384).

1874.91	173°.3	36″.31	3*n*	Δ	4.2...8.0
1879.72	173.0	35.54	2*n*	β	...8.7
1887.26	173.0	35.31	5*n*	Franz	
1903.88	173.0	36.12	2*n*	β	

H^{2} mentions a third 15 m star *n*; the only measures are:

1879.72	357°.3	54″.96	2*n*	β	...11.5
1903.88	356.7	55.03	2*n*	β	

[H^{2}... Ra (**XXVII**, **XXIX**, **XXXII**, **XXXV**, **XXXVI**)...β^{3}... Δ (I)... Pk... Franz (3080)...β^{6}...]

30 30 **330.** **β** 1097. Discovered with the 36-inch. The magnitude in the *Radcliffe Catalogue* is 7.4, and in DM 7.0. So far there is no evidence of change.

1891.56	251°.7	0″.48	3*n*	β
1898.00	252.4	0.60	2*n*	Hu
1899.85	251.4	0.40	3*n*	Bar

[β (**XVI**)...β (2956, 3113)...β (*Pub. L. O.* **II**)...A (3465)...Hu (*Bul. L. O* No. 44)... Barnard (   )...]

(See p. 1056)

30 47 **331.** **H** 3379. Evidently fixed.

1879.76	231°.3	14″.49	3*n*	Cin	7.0... 9.5
1897.75	231.2	14.41	1*n*	See	7.0...11.2

[Cin^{4}...Cin^{6}...See (3495)...]

30 59 **332.** **β** 230. Discovered with the 6-inch. Unchanged.

1898.69	323°.7	3″.55	1*n*	β
1900.77	322.8	3.86	3*n*	Doo

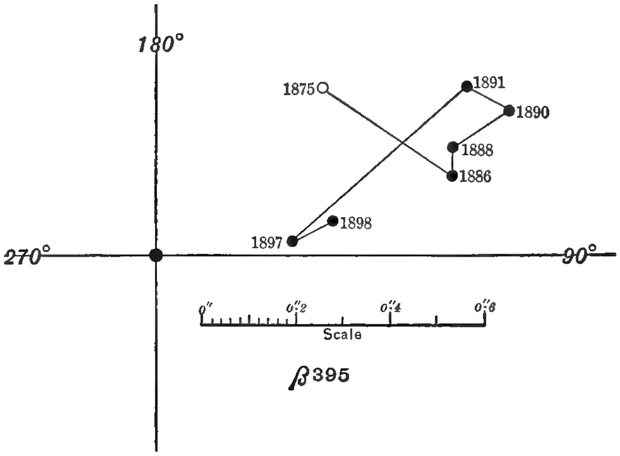
[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3113)...β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

31 · **333.** **Hd** 29. Measured at the Kirkwood Observatory.

1903.81	342°.0	23″.48	1*n*	Bulleit

31 12 **335.** **β** 395. This interesting system was discovered with the 6-inch, and it was evident from the first that it was a physical pair from the large proper motion of the components, since if this movement belonged to one of the stars only, a few years preceding its discovery it would have been a wide and easy pair, and hence catalogued as a double star.

See, using the measures to 1897.67, has computed the orbit, and found a period of 16.3 years (*A. N.* 3455). This assumes a change in position-angle of about 180° between 1891 and 1897. From the slow motion in angle and distance between the date of discovery and the last measures in 1891, it seems very probable that in all the observations the companion star should be put in the same quadrant. It will be seen from the magnitude estimates when the distance was the greatest that the components are very nearly equal, and a correction of 180° may be considered as allowable in any of the measures. It is not material whether we consider the second or the fourth quadrant as the correct one for the smaller star. There is no question of the binary character of this pair, but if the change has been in a gradual approach of the two components, as seems most likely, the period will not be a short one. The measures for the next few years will show whether or not there has been any rapid angular motion. The principle measures to 1897 are shown on the accompanying diagram. Some of the later observers place the smaller component in the fourth quadrant, and perhaps the earlier observations should have a correction of 180°.



β395

Some of the values for the proper motion are:

Stumpe	1″.402 in 91°.3
Kustner	1.379 in 90.6
Porter	1.524 in 90.2
Bossert	1.409 in 91.2

1888.89	109°.6	0″.67	3*n*	Lv	6.0... 6.4
1889.99	111.4	0.88	2*n*	Hl	6.0... 6.0
1890.82	112.6	0.74	3*n*	β	6.0... 6.1
1891.85	118.2	0.75	3*n*	β	6.9... 7.2
1897.65	278.2	0.22	2*n*	See	
1897.67	272.8	0.25	1*n*	Cg	
1897.82	85.9	0.39	1*n*	β	
1897.92	273.7	0.27	3*n*	A	
1897.92	275.1	0.31	3*n*	Hu	
1898.59	280.4	0.38	3*n*	A	6.2... 6.3
1898.69	97.5	0.68	1*n*	β	7.5... 7.5
1899.72	286.7	0.51	3*n*	A	
1900.80	115.9	0.70	2*n*	Doo	
1902.80	113.6	0.57	1*n*	Doo	

[β (**VII**) ... β (2103, 3048, 3113)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... Pollock (*Pub. Sydney Obsy.*, 1891)(*Mem. R. A. S.* **L**) ... Lv^{1}... Lv (*Sid. Mess.* **VIII**, 77)(*Proc. Haverford Coll. Obsy.*, 1891)... Hall (**II**)... See (*A. J.* 412) ...See (3455, 3495)...A (3584, 3638)(*A. J.* 424, 429)...Hu (*A. J.* 427)...See (3636)...Solá (3679)...Doolittle (*Pub. Flower Obsy.* **I**)(*A. J.* 547)...]

(See p. 1056)

337. **H** 1040. The only measures are: 31^{m} 37^{s}

1901.76	354°.3	5″.03	2*n*	β^{5}	10.9...11.2

31^m 41^s **338.** **Hd** 30. The only measures are:

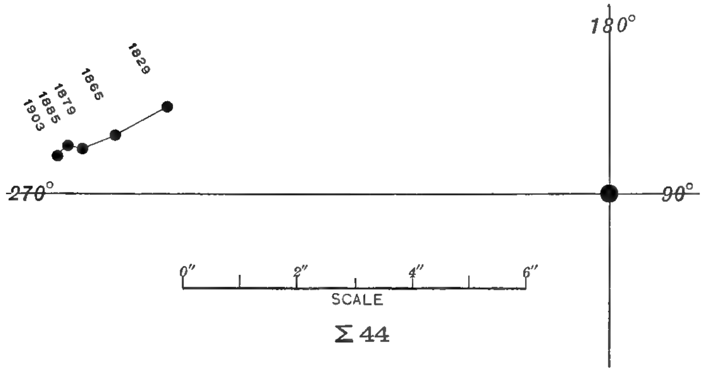
1892.80	43°0	5″83	2*n*	Jones	8.6...9.3
1904.53	43.0	6.16	2*n*	β	9.5...9.9

[Jones (*Proc. Haverford Coll. Obsy.* 1892)...β^6...]

31 41 **339.** **Ho** 305. Discovered by Hough. He mentions a third star, 19°: 19″7 (*A. N.* 3233).

(See p. 1056)

31 56 **340.** **Σ** 44. Angle and distance increasing from proper motion which the measures give as 0″027 in the direction of 115°2.



1865.09	263°2	8″66	6*n*	Δ
1879.06	265.0	9.20	2*n*	Hl
1885.85	264.8	9.45	6*n*	En
1896.04	266.3	9.52	3*n*	A
1903.90	266.1	9.59	3*n*	β

[Ma (*F. S.* **I**)...H^1...Se...Gl...Du...Δ (1572)...Δ (**II**)...WS...WS^2... Flm...Pt...Sk^2...En (2742)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...OΣ (**IX**)(**X**, p. 150)...β (*Ast. and A.-P.* **XIII**, 19)...A (3395)...Glasenapp(**IV**) ...HΣ (**XII**)...Do (3798, 3930)...Thiele (3837)...β^6...]

31 56 **341.** **Hd** 31. No measures in Hd. Measures by β^5. The principal star is 6.8 in DM, and has a proper motion of 0″087 in 253°4.

32 **342.** **Lamont** 1. From *Annalen der Sternwarte Munchen* XVII. I failed to find this on two nights with the 40-inch in 1904. In the course of this search No. 352 was found and measured.

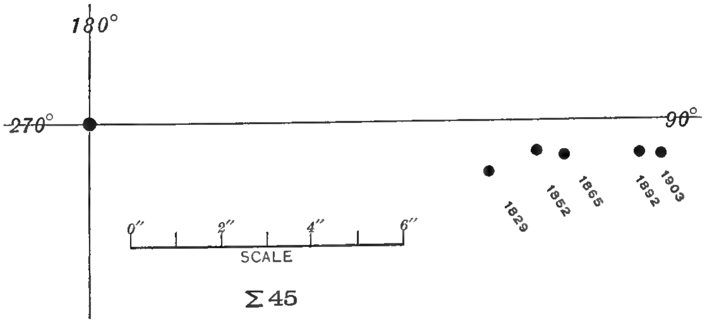
32 3 **344.** **Hd** 32. This is the place of DM (2°) 83. Examined in 1904 with the 40-inch. There is nothing nearer than a 10m companion, 159°8: 25″1. The description in Hd undoubtedly belongs to Hd 30 (No. 338).

32 4 **345.** **OΣ (App)** 5. B is Rad^1. 168, 18^{s}5 *f* and 92″3 *s*.

1883.09	143°7	115″91	6*n*	Franz

[Δ (I)...Franz (2649)...]

346. **Σ** 45. *Cassiopeiae* 63. Rectilinear motion. 32^m 7^s



1865.11	85°9	10″39	6*n*	Δ
1892.02	86.3	12.07	2*n*	HΣ
1896.04	88.0	11.79	3*n*	A
1903.88	86.3	12.56	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...H (**V**)...Flm...Gl...Δ (1572)...Δ (**II**)... WS...A (3395)...HΣ (**XII**)...Espin (*Mon. Not.* **LXII**, 528)...β^6...]

(See p. 1056)

347. **β** 1159. This very minute and difficult pair, discovered with the 36-inch, is involved in the extreme preceding end of the great nebula in *Andromeda*. The magnitude in DM is 8.9. Examined by A (1899.89) and elongation suspected in 52° ±, with distance of 0″2 or less, but conditions not good enough for accurate measurement. 32 28

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...A (*Bul. L. O.* No. 11)...]

349. **OΣ** 16. (= **H** 1041.) The distance may be decreasing, probably from proper motion. 32 32

1867.09	25°0	14″24	3*n*	Δ
1880.47	23.1	13.90	5*n*	β
1898.76	22.9	14.17	3*n*	Hu

[Ma (**XIII**)...β^3...Δ (I)...En (2742)...OΣ (**IX, X**)...Hu (*Pub. L. O.* **V**)... Do (3930)...]

352. **β** 1311. Noted with the 40-inch in trying to find No. 342. 32 45

354. δ *Andromedae.* **β** 491. Discovered with the 26-inch of the Naval Observatory. The proper motion of this star, according to Auwers, is 0″147 in the direction of 123°0. It is evident from the measures that this movement is common to both stars. Assuming the measured distance of 1878 as correct, the distance of the companion, if fixed in space, should have been 30″9 at the date of my last measures in 1898. It is certain, therefore, that these stars form a physical system, although apparently relatively fixed for the last twenty years. 32 54

1888.71	299°7	27″60	3*n*	β
1890.56	299.4	28.18	3*n*	β
1898.55	299.2	27.90	3*n*	β

[β (**X**)...β^1...β^3...β (2875, 3048)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

$33^m\ 8^s$ **357.** ΟΣ 17. There appears to be no change.

1867.66	160°7	8″39	4*n*	*Δ*
1898.80	161.7	8.47	3*n*	Hu

[Ma (**XIII**)...ΟΣ (**IX**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

33 35 **358.** **H 3380.** There is no bright star in this place, and I could not find any such pair in this vicinity. It may be identical with H 2067, which is 1^h more R. A. The descriptions agree (β^5).

33 37 **359.** **β 257.** Discovered with the 9.4-inch of the Dartmouth College Observatory. Change in angle is probable. The later measures are:

1876.04	236°6	0″48	4*n*	*Δ*
1891.68	237.1	0.65	3*n*	*β*
1898.00	244.3	0.66	2*n*	Hu
1900.80	235.0	0.62	2*n*	Doo
1901.75	229.9	0.46	1*n*	Bryant
1903.82	241.9	0.54	1*n*	Lewis

[*β* (**V**)...*β* (*Mon. Not.* **XXXV**, 31)...*Δ* (**I**)...*β* (3113)...*β* (*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...Doolittle (*A. J.* 547)...Lewis and Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIV**, 789)...]

33 37 **360.** 55 *Piscium.* **Σ 46.** *Yellow: deep red*, *Δ*; *yellow: blue*, or *purple*, Wr. No material change in angle or distance. *A. G. Berlin* gives different proper motions for the components. but it is evident from the measures that they have precisely the same movement.

A = 0″027 in 158°6
B = 0.041 in 136.7

1868.52	193°3	6″44	4*n*	*Δ*
1870.32	192.0	6.34	5*n*	Du
1880.76	193.2	6.43	4*n*	Sp
1880.79	193.8	6.52	3*n*	*β*
1886.94	192.5	6.60	3*n*	Hl
1903.89	191.7	6.81	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H (**V**)...Wr...Bp...Ba (**I**)...Ra (**XXI**)...*Δ* (1118)...*Δ* (**I, II**)...Du...Gl...Mh...Se...Se³...Pk...Pt...Sp (**II**)...Giaconelli (**I**)...β^3...Hl (**II**)...Glasenapp (**II, IV**)...*Annals Toulouse Obsy.* **III**...Bowyer (*Mon. Not.* **LXIV**, 789)...Coleman (*Mem. R. A. S.* **LIV**)...]

33 42 **361.** *α Cassiopeiae.* (AD = **H 1993** = **H̤ V. 18** = **Sh 5.**) The nearest companion, B, was found by me with the 36-inch, and C with the 18½-inch. The first is exceedingly faint, and requires a large aperture. The H companion was rated by him much too small. It is about 9 m. I have seen it readily with an aperture of one inch. The slight change in its position is due to proper motion. The measures 1854–1903 give the annual movement of A, 0″058 in the direction of 118°6. From meridian positions we have:

Auwers	0″048 in 142°2
Newcomb	0.061 in 121.0

A and D

1781.96	275°4	56″17	1*n*	H̤
1854.93	279.5	61.44	18*n*	ΟΣ
1878.11	279.9	62.38	2*n*	*β*
1889.60	280.2	63.20	3*n*	*β*
1903.85	280.2	64.15	4*n*	*β*

The only other measures of C are:

1889.60	106°5	39″72	3*n*	*β*
1904.76	105.3	38.53	2*n*	*β*

[P¹...Pk...Bl (**V**)...Sadler (*Mon. Not* **XXXIX**, 185)...β^1...β^2...*β* (2956)...*β* (*Pub. L. O*, **II**)...ΟΣ (**X**, p. 2)...Pritchard (*Oxford Obsns.* Part 3) parallax...*β* (*Ast. and A.-P.* **XIII**, 18)...β^6...]

362. **H 1044.** The other observations are: $33^m\ 44^s$

1830+	140°3	20″±	1*n*	H	9–10...9–10
1879.61	318.8	21.90	2*n*	Cin	8.5... 8.7

[H (**IV, V**)...Cin⁶...]

363. **Σ 47.** *Andromedae* **125.** H (IV) speaks of a third star near B, 243°2 : 18″±. This is undoubtedly C of Σ, which is only incidentally mentioned in *Mens. Micr.* All relatively fixed. 33 59

AB	1881.64	205°6	16″35	3*n*	*β*
	1903.90	205.4	16.43	2*n*	*β*
AC	1881.64	229.0	42.26	2*n*	*β*
	1903.90	230.1	42.89	2*n*	*β*
BC	1881.64	243.4	27.88	3*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...*Δ* (**II**)...β^4...Glasenapp (**II**)...*Annals Toulouse Obsy.*, **III** ..Coleman (*Mem. R. A. S.* **LIV**)...β^6...]

364. *Ceti* **91.** **β 109.** Unimportant distant companion: noted with the 6-inch. Lalande 1064. 34 27

B and C

1893.82	160°3	11″61	1*n*	W
1898.69	160.1	11.78	1*n*	*β*
1898.79	160.5	11.24	5*n*	Cg

A and C

1893.82	356.6	91″53	1*n*	W
1898.69	356.4	91.90	1*n*	*β*
1898.67	355.9	92.21	1*n*	Cg

A and B

1898.79	354°8	103″05	4*n*	Cg

[*β* (**III**)...*β* (*Mon. Not.* **XXXIV**, 59)...*β* (*Pub. Y. O.* **I**)...*Δ* (**I**)...Cin³...Wilson ( )...Cogshall (*A. J.* 478)...]

365. Both stars are given in A. G. Measured in looking for H 1996. 34 35

[β^6...]

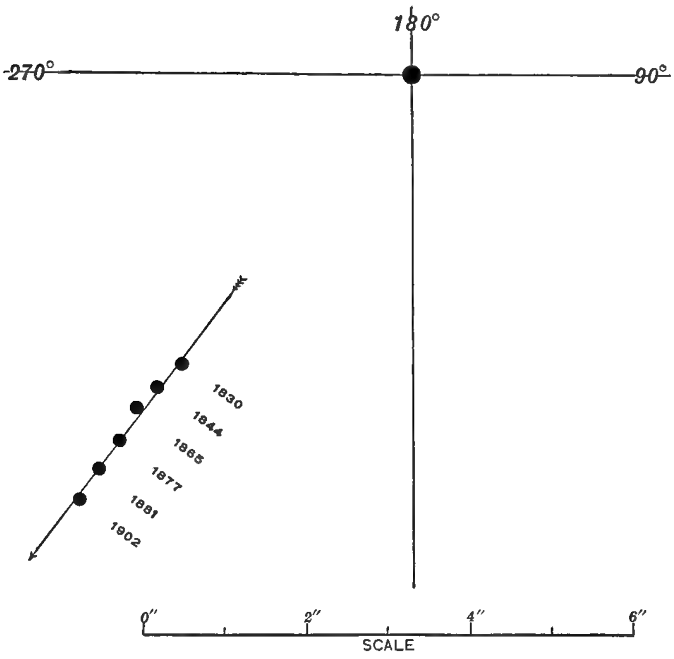
366. **H 323.** This is P 0^h. 146. Apparently fixed. 34 35

1879.88	289°9	65″10	2*n*	*β*	6.2... 8.7
1903.90	289.3	64.85	2*n*	*β*	

[H (**VII**)...β^3...Solá (3523)...β^6...]

367. **A 434.** Discovered by Aitken (*Bul. L. O.* No. 50). 34 39

$34^m\ 42^s$ **368.** Σ 49. The distance increasing, but only an optical pair. The measures give for the relative proper motion of A,



Σ 49

0″022 in 142°6. On one occasion in 1902, I thought A might be a close pair, but it was not verified.

1830.92	321°5	4″49	3*n*	Σ
1865.18	319.7	5.24	3*n*	Δ
1877.87	320.8	5.68	2*n*	β
1881.83	321.3	6.10	3*n*	β
1902.67	321.6	6.55	4*n*	β

[**Ma** (*F. S.* **I**)...**Ma** (**XI**)...**Ba** (**II**)...Flm...Pt...Δ (1572)...Δ (**II**)...Cin⁴...β¹...β³ (p. 325)...Glasenapp (**II**)...β⁶...]

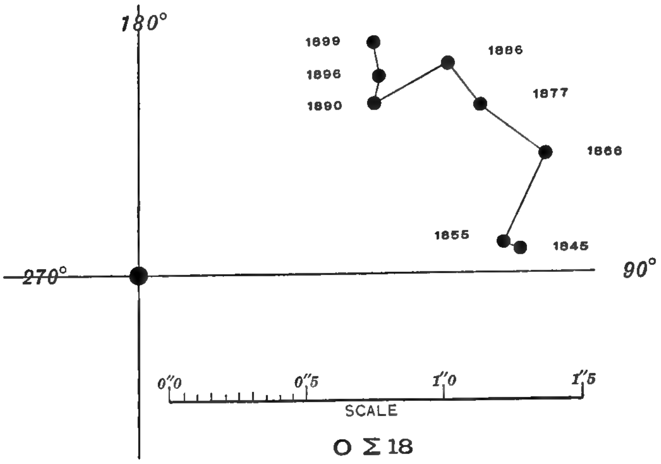
35 10 **372.** Σ 48. Apparently no change in either angle or distance.

1867.90	333°5	5″45	4*n*	Δ
1893.00	333.8	5.40	2*n*	Gla

[**Ma** (*F. S.* **I**)...H¹...H (**V**)...**Ma** (**IX, X**)...Wr...*Gr. Obsns.* 1840...Ra (**XXIII**)...Du...Δ (1118)...Δ (**I, II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...] (See p. 1056)

36 12 **374.** OΣ 18. Binary system in slow motion. Hussey, from the measures to 1899, finds a provisional period of 182.75 years. He suggests that the observations may be fairly well represented on the hypothesis of rectilinear motion. It will be seen from the accompanying diagram that the elements cannot be known for a long time.

1855.18	94°7	1″34	2*n*	OΣ
1866.60	106.2	1.55	3*n*	Δ
1877.95	116.1	1.39	1*n*	β
1886.97	124.1	1.37	2*n*	Hl
1890.96	125.6	1.08	6*n*	Sp
1896.45	129.2	1.15	3*n*	A
1899.03	134.4	1.22	5*n*	Hu



O Σ 18

[**Ma** (**XI**)...OΣ (**IX**)...Se...Pt...Δ (**I**)...Sk³...β¹...Hl (**II**)...H Σ (**XII**)...Callandreau (*Bul. Ast.* **XII**, 523)...Big (*Bul. Ast.* **XII**, 299)...A (3395)...Hu (*Pub. L. O.* **V**)...*Mon. Not.* **LXII**, 383...] (See p. 1056)

377. A 435. The *f* star of two of the same brightness (*Bul. L. O.* No. 50). $36^m\ 20^s$

378. H 1046. "One of a large fine cluster." 36 25

AB	1879.49	68°0	16″38	1*n*	β³	
	1903.77	66.9	16.22	2*n*	β⁶	10.6...11.2
AC	1903.77	355.0	52.79	2*n*	β⁶	...10.8

383. Σ 51. No evidence of change. 37 16

1865.43	128°9	4″20	3*n*	Δ
1879.86	129.8	4.23	3*n*	Hl
1902.77	128.1	3.96	2*n*	Do

[**Ma** (*F. S.* **I**)...**Ma** (**X, XIII**)...Wn (1738)...Flm...Pt...Wn (**V**)...Sk²...Se...Δ (**II**)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Big...Lv (*Proc. Haverford Coll. Obsy.* 1891)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...*Annals Toulouse Obsy.* **III**...Do (3930)...]

384. Σ 53 *rej.* This star has considerable proper motion: 37 18

Porter	0″415 in 216°6
Kustner	0.375 in 221.7
A. G. Nico.	0.301 in 228.4

There are no early measures of B, but it appears certain that it is not moving with A.

1891.81	334°6	26″47	3*n*	Eng	9.0... 9.7
1896.11	335.0	26.54	3*n*	A	8+...10
1901.76	338.6	27.70	2*n*	β	8.0... 8.7

[Engelhardt (**III**)...A (3395)...β⁵...] (See p. 1056)

$37^{m}\ 21^{s}$ **385.** **OΣ 19.** There seems to be no change.

1867.87	114°2	9″72	4*n*	Δ
1878.87	114.4	9.58	2*n*	β
1890.97	113.8	9.61	1*n*	H Σ
1898.80	115.3	9.84	3*n*	Hu

[Ma (**XIII**)...Δ (I)...En (2742)...Sk^{3}...OΣ (**IX**)(**X**, p. 190)...β^{3}...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

37 22 **386.** **Σ 54.** Since Part I of this catalogue was in type, I have measured this pair, and find that it is wrongly identified. It is DM (32°) 125, the place of which is:

$$\left.\begin{array}{l}\text{R. A.} = 0^{h}\,37^{m}\,55^{s}\\ \text{Decl.} = 32^{\circ}\,52'\,44''\end{array}\right\}$$

There is no change since Struve.

1867.12	194°7	17″64	3*n*	Δ
1904.68	193.1	17.81	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XII, XIII**)...WS...Gl...Δ (**II**)...β^{6}...]

37 28 **387.** **H 1996.** "Double; no description." Identified in the DM and measured.

1903.79	82°8	8″70	3*n*	β^{6}	9.7...9.9

37 31 **388.** **Σ 52.** Motion is uncertain, but later measures give a smaller position-angle.

1867.20	17°8	1″23	3*n*	Δ
1878.84	19.1	1.54	1*n*	β
1896.87	14.8	1.41	1*n*	Hu
1897.43	16.3	1.54	5*n*	Doo
1902.95	15.7	1.44	2*n*	Do

[Ma (*F. S.* **I**)...H (**V**)...Δ (2194)...Δ (**II**)...Flm...Pt...β^{2}...β^{3}...Sk^{3}...Se ....Hu (*A. J.* 397)....Doolittle (*Pub. Flower Obsy.* **I**)....HΣ (**XII**)....Do (3930)...]

37 44 **391.** **21** *Cassiopeiae.* **H N. 122.** This star has a proper motion of 0″050 in 224°4 (Auwers). The only measures since H are:

1903.76	160°1	35″57	2*n*	β^{6}	...9.7

37 55 **392.** **Σ 55.** Very little if any change.

1869.82	324°6	1″92	5*n*	Δ
1904.50	327.2	1.86	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...Se...Se^{2}...Ra (**XXIX**)...Gl...Δ (**II**)...WS...β^{6}...]

37 58 **393.** **Σ 56** *rej.* Given from *Catalogus Novus.* Since the first part of this catalogue was in type, I have identified and measured this pair. It is DM (32°) 125, and the place (1880) is

$$\left.\begin{array}{l}\text{R. A.} = 0^{h}\,37^{m}\,55^{s}\\ \text{Decl.} = 32^{\circ}\,53'\end{array}\right\}$$

1904.61	193°2	18″03	2*n*	β^{6}	9.0...9.3

38 2 **395.** *o Cassiopeiae.* **β 231.** Discovered with the 6-inch. Auwers gives as the proper motion of the principal star, 0″016 in the direction of 190°7. The movement is too small to say with certainty whether the two are moving together.

1878.47	303°7	32″16	1*n*	β
1888.71	303.5	32.63	3*n*	β
1898.00	303.1	32.66	2*n*	Hu
1904.61	303.8	32.67	3*n*	β

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^{1}...β (2875)...β (*Pub. L. O.* **II**)...Δ (**I**) ...Hu (*Bul. L. O.* No. 44)...β^{6}...]

397. **A. G. 7.** From *A. G. Leipzig.* $38^{m}\ 8^{s}$

1902.86	318°5	20″43	2*n*	Cogshall

398. **H 1051.** "A curious double star." Hussey measures a star 1° *s* which he thought might be this pair: 38 11

1901.95	282°2	3″64	3*n*	Hu	9.0...12.0

However, I find a star substantially in the H place, and it is assumed to be the one in question, although the angle disagrees. It is near DM (23°) 98.

1900.74	221°1	6″70	2*n*	β	11...13.2

[β^{6}...Hu (*Bul. L. O.* No. 44)...]

399. **Hn 3.** From *Pub. Washburn Obsy.* I. 38 24

1888.74	52°7	3″14	3*n*	Com

[β^{4}...Comstock (*Pub. Washburn Obsy.* **VI**)...]

401. **β 492.** Discovered with the 26-inch at the Naval Observatory. *A. G. Harvard* gives the proper motion of this star as 0″066 in the direction of 317°3. The measures show relative fixity, and they are, therefore, moving together. A naked-eye star in *Cassiopeia.* 38 27

1885.69	150°7	2″23	2*n*	HΣ
1889.55	152.7	2.11	3*n*	β
1898.65	151.5	2.12	2*n*	β
1900.19	151.9	2.25	3*n*	Doo

[β (**X**)...β^{1}...β (2956)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**) ...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...] (See p. 1056)

402. **β 865.** Discovered with the 18½-inch. Without change. β 866 is closely following. 38 52

1891.83	197°4	1″30	3*n*	β	8.3...8.8
1898.00	195.5	1.30	2*n*	Hu	
1898.95	192.0	1.48	1*n*	Bowyer	
1900.57	196.8	1.28	3*n*	Bryant	

[β (**XIII**)...β^{3}...β (3113)...β (*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)... Doolittle (*Pub. Flower Obsy.* I)...Bowyer and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 494; **LXI**, 486; **LXII**, 383)...]

403. **Arg. 2.** (= **Es 43.**) "Duplex Cl. IV" in O. Arg. Espin has a 12.5 m star, 72°6: 14″3 (1901). A has a proper motion of 0″099 in 111°9 (*A. G. Harvard*). 38 59

1901.87	117°5	13″8	2*n*	Espin	8.0...9.0

[Espin (*Eng. Mech.* **LXXIV**, 338)(*A. N.* 3784)...] (See p. 1056)

39m 0s **404.** **H 626.** "Large star *very red.*" I have measured a third star. A only *yellowish.*

AB	1901.73	346°1	32″31	2*n*	β^{5}	8.5...11.0
BC	1901.73	106.4	10.35	2*n*	β^{5}	...12.5

39 4 **405.** **β 493.** Discovered with the 18½-inch. The *p* of a small triangle of 9 m stars. There seems to be no sensible change. There is a 3″8 pair of stars 89″ distant in the direction of 216°8.

1891.85	51°4	0″77	2*n*	β
1891.92	55.6	0.5±	1*n*	Sp
1898.76	54.7	0.69	1*n*	β

[β (**X**)...β^{1}...β (3113)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Sp (**III**)...]

(See p. 1056)

39 38 **412.** **Σ 57** *rej.* Place and measures from H (V). In *Cat. Nov.*, Cl. II, 9...9–10. It is DM (71°) 36.

1904.70	198°9	6″32	2*n*	β^{6}	9.4...9.8

39 42 **413.** **Muller 1.** Discovered by Muller at the McCormick Observatory.

1890.01	191°0	2″00	1*n*	Ho
1898.69	195.1	2.92	1*n*	β

[LM...Ho (*A. J.* 215)...Ho (3234)...β^{6}...]

(See p. 1056)

39 43 **414.** **β 866.** Discovered with the 18½-inch. Unchanged.

1891.83	69°6	1″39	3*n*	β
1900.80	70.8	1.55	2*n*	Doo

[β (**XIII**)...β^{3}...β (3113)...β (*Pub. L. O.* **II**)...Bryant (*Mon. Not.* **LX**, 494; **LXI**, 486; **LXII**, 383)...Doolittle (*A. J.* 547)...]

39 58 **415.** **Σ 1, App. I.** (= **H V. 123 = Sh 6 = OΣ (App) 6.**) Relatively fixed, unless small change in angle. B is DM (50°) 142.

1865.83	53°7	46″40	5*n*	Δ
1878.82	52.7	46.83	5*n*	Je
1889.46	52.6	46.36	4*n*	Gla

[Δ (1574)...Δ (**II**)...Schur (2255)...Je (2329)...Ra (**XXI, XXV. XXXV, XXXVI**)...Franz (3080)...Maiebckto (*Obsns.* 1892).. Glasenapp (**III**) .]

40 38 **417.** **H V. 82.** (= **OΣ (App) 7 = Sh 7.**) The change is evidently from proper motion.

1823.81	78°5	47″14	1*n*	Sh	8 ...8½
1875.36	77.1	49.76	3*n*	Δ	6.7...7.1
1881.61	76.9	50.15	4*n*	β	7.9...8.1
1903.80	76.7	51.14	2*n*	β	7.6...7.7

[Δ (**I**)...β^{4}...Franz (2649)...Espin (*Mon. Not.* **LXII**, 531)...β^{6}...]

40 53 **420.** **β 494.** Discovered with the 18½-inch. Apparently fixed.

1886.80	171°2	1″36	3*n*	LM	8.0... 8.0
1888.76	170.5	1.27	4*n*	Lv	8.3... 8.4
1888.87	171.4	1.39	4*n*	T	8.0... 8.0
1892.86	171.8	1.37	1*n*	Gl	8.2... 8.2
1898.65	172.0	1.33	3*n*	Bd	8.2... 8.3

[β (**X**)...β^{1}...Lv^{1}...LM...Tarrant (2991)...Glasenapp (**II**)...Boothroyd (*A. J.* 478)...Coleman (*Mem. R. A. S.* **LIII**)...Solá (3563)...Doolittle (*Pub. Flower Obsy.* **I**)...]

421. **Bowyer 1.** Discovered by Bowyer at the Greenwich Observatory. Not identified in any star catalogue. 41m :5

[Bowyer (*Mon. Not.* **LIX**, 400) ...]

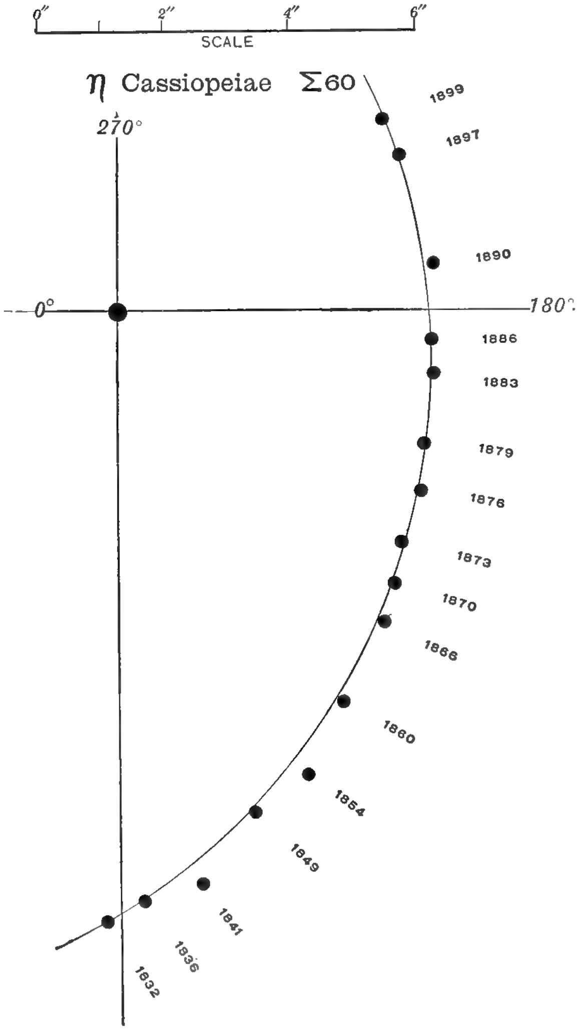
422. **Σ 59.** (= **H I. 40 = S 389.**) Relatively fixed. *A. G. Harvard* gives a proper motion of 0″032 in 90°. 41 11

1869.80	147°4	2″06	5*n*	Δ
1871.94	148.1	2.30	8*n*	Du
1885.83	146.8	2.04	4*n*	Hl
1893.05	147.4	2.31	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**IX, XIII, XV**)...Mu...Ek (**I**)...Da^{1}...Da^{2}...Se...WJ...Wr...WJ^{2}...Mh...Ra (**XXI**)...Gl...Flm...Pt...Sk^{2}...Sk^{5}...Je (2449)...Do (2989, 3798, 3930)...Do (*Trans. R. I. Ac.* **XXIX**, Part 13)...Δ (1118, 1256, 2077)...Δ (**I, II**)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Du...Kn...En (1673, 2663)...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Espin (*Mon. Not.* **LXII**, 528)...]

424. **OΣ (App) 8.** Measures from Δ (I). (See p. 1056) 41 25

426. *η Cassiopeiae.* **Σ 60.** (= **H III. 3 = Sh 8.**) A very interesting binary system, and as it is at all times a very easy pair, within reach of the smallest telescopes, it has been very 41 43



fully measured by nearly all the observers. As the motion is very slow, so many observations were unnecessary. Orbits have been computed as follows:

1859	Powell	181. yrs.	*Mon. Not.* XXI, 66
1875	Doberck	222.43	*A. N.* 2091
1875	Dunér	176.37	*Mesures Microm.* Lund, 1876
1876	Gruber	195.23	*A. N.* 2111
1879	Coit	167.4	*Mon. Not.* XLII, 359
1894	Lewis	208.1	*Mon. Not.* LV, 19
1895	See	195.76	*A. J.* 343, 355; See (I)
1898	Russell	202.5	*Pop. Ast.* VI, 154; *A. J.* 434
1900	Doberck	327.87	*A. N.* 3743
1901	Comstock	500 ±	*A. J.* 512

The date of the last measure used is given in the first column. As the whole arc described by the companion since the measures of Σ is only about 90°, it is evident that any result found at this time would be at the best not even roughly approximate, since a variety of ellipses will equally well represent the observations, within allowable limits, in so short an arc. The system has a proper motion of 1″212 in 115°2 (Auwers).

The following measures by the leading observers will be sufficient to show the relative change, and total arc described.

1832.58	88°6	9″74	9*n*	Σ
1836.70	92.1	9.39	4*n*	Σ
1841.34	98.1	9.21	3*n*	OΣ
1849.66	105.0	8.26	4*n*	OΣ
1854.56	112.0	7.97	4*n*	OΣ
1860.68	119.8	7.17	2*n*	OΣ
1866.72	130.4	6.48	7*n*	Δ
1870.67	135.3	6.16	7*n*	Δ
1873.66	140.7	5.79	7*n*	Δ
1876.61	149.3	5.59	7*n*	Δ
1879.01	156.8	5.35	4*n*	Hl
1883.94	168.8	5.12	3*n*	Hl
1886.94	175.3	4.99	5*n*	Hl
1890.79	188.3	5.06	5*n*	Hl
1897.31	209.0	5.08	6*n*	A
1899.47	215.9	5.19	8*n*	A

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...P^1...P^2...P (*Mon. Not.* **XXI**, 65)... *Gr. Obsns.* 1840...J^2...J^3...H^1...H^2...H (**IV**)...*Durham Obsns.* 1846-48...Se...Se^2...Se^3...Se (1017)...Nobile (*Acc. Sci. Nap.* Jan. 1875)...Ba (**I, II, III, IV**)...Ra (**XXI, XXVII, XXIX, XXXII, XXXV**)...Kn...Ek (**I**)... Mh...Bes...Lu (**I, II, III**)...Wr...Wn (1738)...Bp...Miller (790)...Auwers (1393)...Lu (1103)...Peters (1042)...WS...Hd...Gl...Du...Je (2449)...Sk ...Sk^2...Sk^3...Coit (*Mon. Not.* **XLII**, 359)...Da^1...Da^3...Wh...Ma (324) ...Powell (*Mon. Not.* **XLIV**, 18)...Seagrave (*Sid. Mess.* **II**, 258)...Wn (**V**)... K (409, 1519)...Gruber (2111)...Bru...Pl...Je (2324)...Do (2091, 2101, 2196, 2242, 2989, 3378, 3466, 3680, 3743, 3798, 3930)...Do (*Trans. R. I. Ac.* **XXIX**, Part 13; **XXVI**)...Kn...Goldney (2257)...L. Struve (*Melanges Math. et. Ast.* **V**)...Flm...Pk...Δ (*Mem. Acc. Sci.*)...Δ (1011, 1100, 1185, 1473, 1572, 1735, 1798, 1886, 1979, 2077, 2192)...Δ (**I, II**)...Pt...Franz (2590)...Do (*Observatory* **II**, 211)...En (2663, 2786)...T (2866)...Hl (*Wash. Obsns.* 1881, 1883, 1885)...Hl (**I, II**)...Collins (*Proc. Haverford Coll. Obsy.* 1891)... Lamont (*Annalen Sternwarte bei Munchen* **XVII**)...Maw (**I, II, III, IV**)... See (*Beob. Berlin*, 1892)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...OΣ (**IX**) (**X.** pp. 54, 150)...*Acad. Sci. St. Petersburg* **XIV**, 231...*Annals Obsy. of Moscow* **VIII**, Part 2...Glasenapp (**II, III**)...Davis (*Photo Measures of 62 Stars about η Cassiop.*, N. Y. Acad. Sci. **VIII**)...OΣ (*Melanges Math. et Ast.* **VI**)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Sk^4...Everett (*Mon Not.* **LVI**, 464)...Collins (*A. J.* 378)...Searle (*A. J.* 299)...See (*A. J.* 343, 349, 355, 359, 378)(*A. N.* 3314)(**I**) ... Com (*Pub. Washburn Obsy.* **X**) ... Davis (*A. J.* 343)...Hu (*A. J.* 397, 427)...Espin (*Brit. Ast. Ass'n* **III**, 227) Doolittle (*A. J.* 416)...Chofardet (3450)... Russell (*Pop. Ast.* **VI**, 154)(*A. J.* 434)...Morgan (*A. J.* 439)...Ho (3558)...Coleman (*Mem. R. A. S.* **LIII**)... Solá (3679)...Doolittle (*Pub. Flower Obsy.* **I**)...Gl (*Mon. Not.* **LXI**, 556)... H Σ (**XII**)...Comstock (*A. J.* 512)...Sk^5...Gore (*Mon. Not*, **LXIII**, 167)... Gr. Obsy. (*Mon. Not.* **LV**, 19, 341; **LIX**, 400; **LX**, 494; **LXII**, 383; **LXIII**, 403; **LXIV**, 789) ... A (*Ast. Soc. Pac.* **VII**, 305)(*A. J.* 429)(*A. N.* 3465, 3584) (*Bul. L. O.* No. 11)...Ra (**XLVII**)...]

(See p. 1057)

429. **Innes 261.** Discovered by Innes at the Cape Observatory. 42m 5s

[Innes (3501)(*Mon. Not.* **LXI**, 578; **LXII**, 472)...]

431. **β 495.** Discovered with the 18½-inch. The motion, if any, is very slow. The measures by Hall are erroneously credited to OΣ 20. 42 25

1885.14	225°8	0″60	5*n*	En
1885.87	224.1	0.60	2*n*	H Σ
1887.98	225.0	0.54	2*n*	Hl
1889.92	225.5	0.63	5*n*	Sp
1891.66	224.9	0.65	3*n*	β
1897.87	219.7	0.62	2*n*	L
1898.76	222.5	0.77	1*n*	β
1898.82	220.3	0.85	3*n*	Bowyer
1903.34	224.7	0.57	6*n*	Bowyer

[β (**X**)...β^1...β (3113) ... β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... J. J. M. Perry (*Eng. Mechanic* **XXXVIII**, 192; **XXXIX**, 11)...En (2786)...H Σ (**XII**)...Hl (**II**)...Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 494; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 789)...Doolittle (*Pub. Flower Obsy.* **I**)...]

432. **Hd 35.** The only other measures are: 42 28

1877.88	38°1	6″85	1*n*	β	9 ...10
1901.85	37.0	6.92	2*n*	β	8.7... 9.3

[Hd...β^1...β^5...]

433. **H 1054.** The only measures are: 42 31

1901.80	182°0	8″66	2*n*	β^5	8.2...10.5

435. **Hd 36.** Given in the Harvard list as O. Arg. S. 439 with the correct place of that star. Examined with the 40-inch in 1901, and found not to be a double of any class, and I could not find any pair as described in the vicinity. The nearest pair is β 301, but that does not correspond in measures or magnitudes. 43 10

436. **β 301.** C was discovered with the 6-inch, and in measuring that with the 36-inch the close star was detected. It is difficult with the large instrument. 43 21

A and B

1899.68	319°2	0″86	2*n*	A

A and C

1893.92	298°6	10″57	1*n*	Sel	9 ...10
1898.92	300.0	11.03	1*n*	β	8.3... 8.8

[β (**VI**)....β (2062, 3113)....β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)....Cin^3....Sellors (3240)...A (3638)...]

437. **OΣ (App) 9.** The principal star has a considerable proper motion: 43 21

Stumpe	0″322 in 105°3
Porter	0.263 in 100.3
Rechenberg	0.267 in 103.7

Rechenberg gives the movement of B as 0″052 in 272°2. The following are all the measures since Δ:

1890.08	235°.9	94″.39	5*n*	Franz
1892.02	236.1	94.66	2*n*	Eng
1901.75	236.6	96.41	2*n*	β

A comparison of the measures of Δ and β gives for the relative movement of A, 0″.217 in 92°.1. There is a 12 m star nearly midway, from A 252°.7 and from B 42°.5.

[Δ (I)...Engelhardt (**III**)...Franz (3464)...β5...]

$43^{m}\ 24^{s}$ **438.** **β** 1160. Discovered with the 36-inch. This is a naked-eye star in *Cetus*. The magnitude in Gould is 5.9. The only later measure is:

1901.86	117°.1	1″.28	2*n*	Doo

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...Doolittle (*A. J.* 547)...]

43 26 **439.** 65 *Piscium*. **Σ** 61. (= **H** **II.** 84 = **Sh** 9.) Some of the measures are discordant for so easy a pair to measure. Taken together, they do not show any change. The stars have a common proper motion of 0″.061 in 101°.2 (Auwers).

1868.56	298°.0	4″.39	5*n*	Δ
1882.00	297.5	4.44	4*n*	Sp
1895.92	296.0	4.40	1*n*	Gla
1897.84	297.2	4.42	5*n*	Coleman

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...Ba (**II**)...Ra (**XXI, XXIII**)...Da1...Da2...Da3...P1...Bp...Mh...Wr...Hd...Gl...OΣ (**IX**)...Du...H (**V**)...De (*Mem. Accad. Sci.*)...Δ (I, **II**)...Se...Se3...Sp (**II**)...Nobile (*Acc. Sci. Nap.*, Jan. 1875)...Hl (*Wash. Obsns.* 1875–76, 1885)...Hl (I, **II**)...Per...Per (2684)...Per (2748)...Ma (304, 324)...Maw (**II**)...Glasenapp (**III, IV**)...Chofardet (3450)....Solá (3497)....*Annals Toulouse Obsy.* **III**.... Coleman (*Mem. R. A. S.* **LIV**)...]

43 38 **440.** **β** 232. Discovered with the 6-inch. It is certain that the close pair is in moderately rapid motion. At the time of the discovery of this pair, in October, 1874, the angle of AB was estimated 290°, "nearly in the direction of C," thus confirming the position found by Δ in 1876.

		A and B		
1883.82	291°.0	0″.4	1*n*	Perry
1891.66	320.1	0.41	3*n*	β
1892.84	319.7	0.62	1*n*	Bar
1892.99	321.2	0.4±	1*n*	Sp
1896.09	325.1	0.3±	3*n*	Sp
1897.77	326.1	0.38	2*n*	Doo
1898.65	340.7	0.31	2*n*	β
1900.87	336.2	0.30	1*n*	Doo
		AB and C		
1891.66	293°.8	28″.40	3*n*	β
1897.77	294.3	28.42	2*n*	Doo
1898.65	293.6	28.01	2*n*	β

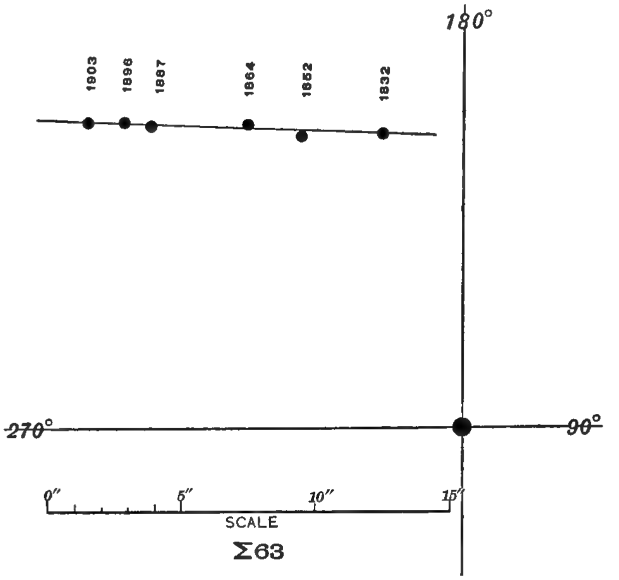
[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...J. J. M. Perry (*Eng. Mech.* **XXXIX**, 11)...Sp (**III**)...β (3113)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* I)...Δ (I)...Barnard (*A. J.* 447)...Doolittle (*Pub. Flower Obsy.* I)(*A. J.* 547) ... Bryant (*Mon. Not.* **LXI**, 486)...]

43 45 **443.** **Σ** 62. Unchanged.

1867.44	303°.3	11″.61	4*n*	Δ
1901.45	302.5	11.70	2*n*	Ku

[Ma (*F. S.* I)...Wr...Du...Δ (**II**)...Kustner (3821)...]

444. **Σ** 63. Distance and angle increasing. This is due to proper motion of A, which from the measures of B is 0″.162 in 87°.7. Furner and Storey find from the meridian positions a motion of 0″.054 in 34°.0, thus leaving most of the relative change due to the movement of B. It seems very improbable that a star of this magnitude should have any such proper motion. $43^{m}\ 56^{s}$



1832.41	195°.2	11″.42	4*n*	Σ
1852.87	208.8	12.52	2*n*	Ma
1864.10	214.8	13.93	3*n*	Δ
1887.81	225.7	16.25	2*n*	HΣ
1896.07	227.6	17.12	3*n*	A
1903.60	230.6	18.10	4*n*	β

[Ma (*F. S.* I)... Ma (**XI, XIII**)... Flm...Δ (1572)...Δ (**II**)...WS... Sk3...A (3395)...HΣ (**XII**)...Sk5...Furner and Storey (*Mon. Not.* **LXIV**, 443)...β6...]

445. **β** 781. Discovered with the 15½-inch at the Washburn Observatory. So far there has been no change. 44 2

1886.86	28°.2	1″.18	2*n*	UL
1888.44	26.5	1.04	3*n*	Com
1891.59	30.0	0.88	3*n*	β
1902.86	28.8	1.10	4*n*	Doo

[β (**XII**)...β4...β (3113)...β (*Pub. L. O.* **II**)...Updegraff, Lamb, and Comstock (*Pub. Washburn Obsy.* **V, VI**) ... Doolittle (*Pub. Flower Obsy.* I)(*A. J.* 547)...]

446. **Ho** 4. Discovered by Hough with the 18½-inch of the Dearborn Observatory. 44 10

1893.32	198°.7	1″.60	2*n*	Ho

[Ho (2778, 3234)...] (See p. 1057)

447. **Σ** 64. Without change. 44 32

1870.13	272°.2	3″.51	4*n*	Δ
1886.94	272.3	3.67	3*n*	Hl

[Ma (*F. S.* I)...Ma (**X, XIII**)...Se...Du...En (2742)...Δ (1011)...Δ (**II**)...Hl (**II**)...Sk3...]

45^m 8^s **448.** **Σ 65.** (=**Sh** 10.) Fixed.

1866.10	37°0	2″87	3*n*	Δ
1904.68	38.6	2.90	2*n*	β

[Ma (*F. S.* I)...H (**IV**)...Ma (**X, XIII**)...Se...Wr...Ra (**XXIII**)...Δ (1204)...Δ (**I, II**)...Com (**VI**)...Do (2989)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^6...]

45 18 **452.** **β 496.** Discovered with the 18½-inch. No sensible change.

1885.97	2°3	5″04	1*n*	HΣ
1891.64	4.2	5.31	2*n*	β
1901.82	2.7	5.44	2*n*	Doo

[β (**X**)...β^1...β (3113)...β (*Pub. L. O.* **II**)...HΣ (**XII**)...Doolittle (*A. J.* 547)...]

45 25 **453.** **H 628.** "Large star red." I found the principal star only yellowish.

1901.76	68°8	42″59	3*n*	β^5	7.7...11.5

45 46 **454.** **Σ 68.** Fixed.

1867.55	295°4	7″52	4*n*	Δ
1892.91	294.7	7.17	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...H (**V**)...β^1...Cin^4...Δ (**I, II**)...Glasenapp (**II**)...]

45 50 **455.** **β 1.** Discovered with the 6-inch. It is a pretty group, in the *np* edge of a large diffused nebula, discovered by Barnard in 1881 (Dreyer 281). The components of this multiple seem to be fixed.

		A and B		
1885.73	82°1	1″62	2*n*	HΣ
1888.66	82.0	1.38	5*n*	T
1889.55	82.6	1.45	3*n*	β
1898.66	79.2	1.63	2*n*	β
		A and C		
1885.73	132°3	3″83	2*n*	HΣ
1888.66	137.2	4.08	5*n*	T
1889.55	134.2	3.82	3*n*	β
1898.58	137.6	3.67	2*n*	β
		A and D		
1885.73	192°7	8″93	2*n*	HΣ
1888.67	193.5	8.76	4*n*	T
1889.55	193.7	8.97	3*n*	β
1898.58	194.4	8.73	2*n*	β
		A and E		
1898.58	332°9	15″86	2*n*	β

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* I)...Δ (2081)....Δ (I)....OΣ (**X**)....HΣ (**XII**)....Tarrant (2991)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Barnard (2588)...]

45 52 **456.** **Σ 67.** Later observers agree in making the angle less than Σ, but the evidence of change is unsatisfactory.

1857.90	7°4	1″39	2*n*	Se
1867.22	7.0	1.86	4*n*	Δ
1877.95	10.8	1.52	1*n*	β
1888.74	3.7	1.70	1*n*	Lv
1895.80	4.4	1.66	2*n*	Collins
1897.74	0.5	1.85	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Se...Δ (2194)...Δ (**II**)...Flm...Cin^6...β^1...Pt...Sk^3...Do (2989)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Lv^1...Ferr...Collins (*A. J.* 378)...Doolittle (*Pub. Flower Obsy.* I)...HΣ (**XII**)...Sk^6...Do (3930)...]

458. **β 497.** This distant double companion was detected with the 18½-inch. The bright star has an annual proper motion of 0″175 in the direction of 331°2 (Porter), and this corresponds to the change of the distant star with reference to A. The small star B is DM (60°) 125. 45^m 55^s

		B and C		
1891.52	149°8	0″76	2*n*	β
1898.73	151.6	0.84	1*n*	β
		A and B		
1888.08	171°4	123″17	2*n*	Eng
1891.51	171.2	123.89	3*n*	β
1895.01	171.7	124.82	2*n*	Eng
1898.72	171.6	125.06	2*n*	β
1904.65	171.4	126.14	2*n*	β

[β (**X**)...β^1...β (3113)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* I)...β (*A. and A. P.* **XIII**, 16)...Engelhardt (*Obsns. Ast.* **II, III**)...β^6...]

(See p. 1057)

459. **Weisse 2.** Marked "duplex" in Weisse. I could not see any companion with the 6-inch in 1876, and the 40-inch in 1901. There are three observations in Weisse, differing slightly in place, and that is probably the cause of being noted as double. There is certainly no companion star near that could have been seen with a meridian instrument. 45 56

460. **A. G. 8.** Noted as double in *A. G. Christiana.* 45 59

1898.47	214°5	17″98	3*n*	Doo

[β (*Pub. L. O.* **II**)...Doo (*Pub. Flower Obsy.* I)...]

461. **H 2000.** The later measures are: 46 6

1879.90	114°2	17″80	1*n*	Cin	
1885.81	115.5	17.17	2*n*	Wilson	9.0...10.7

[Cin^6...Wilson (Cin^{10})...]

463. **O. Stone 3.** Discovered with Cin 11-inch. This star according to Stumpe has a proper motion of 0″255 in 198°6. The following, which are the principal measures, show that the small star is moving with the other: 46 20

1877.84	271°9	2″39	5*n*	Cin
1884.48	273.2	2.31	3*n*	W
1886.85	272.0	2.35	5*n*	LM
1891.77	270.5	2.24	2*n*	Collins
1897.73	267.6	2.25	1*n*	See
1903.01	268.1	2.15	2*n*	Scott

[Cin^4...LM...Wilson (Cin^{10})...Collins (*Proc. Haverford Coll. Obsy.* 1891)...See (3495)...Do (3798)...Scott (*Mon. Not.* **LXIV**, 52)...]

$46^m\ 33^s$ **464.** **β 498.** Discovered with the 18½-inch. No change shown by the measures.

1885.97	158°5	2″57	1*n*	HΣ
1891.96	154.6	2.70	2*n*	β
1902.76	154.3	2.82	5*n*	Doo

[β (**X**)...β1...β (3113)...β (*Pub. L. O.* **II**)...HΣ (**XII**)...Doolittle (*A. J.* 547)...]

46 41 **465.** **A. G. 9.** Noted as double in *A. G. Christiana.*

1898.47	69°3	6″69	3*n*	Doo

[β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

46 47 **466.** **β 734.** Discovered with the 6-inch at Mt. Hamilton There has been no change in the position of the small star. The principal star is 5½ m in Gould (= Lalande 1477 = Lacaille 238).

1879.69	345°6	10″75	1*n*	Cin
1882.74	344.9	11.19	3*n*	W
1888.84	346.9	10.83	2*n*	β
1897.63	345.7	11.24	1*n*	See
1898.71	347.1	10.68	1*n*	β

[β (**XI**)...β2...β (2929)...β (*Pub. L. O.* **I**, **II**)(*Pub. Y. O.* **I**)...Cin6...Wilson (Cin10)...See (3495)...Do (3798)...]

46 52 **467.** **Σ 70.** No change. Both stars are given in *A. G. Harvard*, and to the smaller is assigned a proper motion of 0″106 in 239°4, but probably the larger is referred to, as there are no other meridian positions of B. There is a 2″ or 3″ pair of small stars in the field *sf.*

1864.69	244°9	7″96	3*n*	⅃
1904.28	245.6	8.13	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...H (**V**)...Δ (**II**)...Cin6...Es (*Mon. Not.* **LXIV**, 676)...β6...]

(See p. 1057)

47 7 **468.** **Σ 71.** The principal star is DM (4°) 133. Probably fixed.

1867.68	339°7	8″68	4*n*	Δ
1904.68	340.0	8.92	2*n*	β

[Ma (*F. S.* **I**)...H (**V**, **VII**)...Ma (**X**)...⅃ (**II**)...Se...β6...]

47 17 **470.** **Hd 37.** (= **Ku 7.**) The measure given is by Winlock. It was also measured by Searle, 324°3 : 0″81 (1866.92). There seems to be an error in each of about 100° in the angle, since the later measures show no change.

1877.86	232°3	1″09	1*n*	β	9.0...9+
1896.81	233.3	1.17	3*n*	A	
1897.87	234.5	1.21	3*n*	Doo	

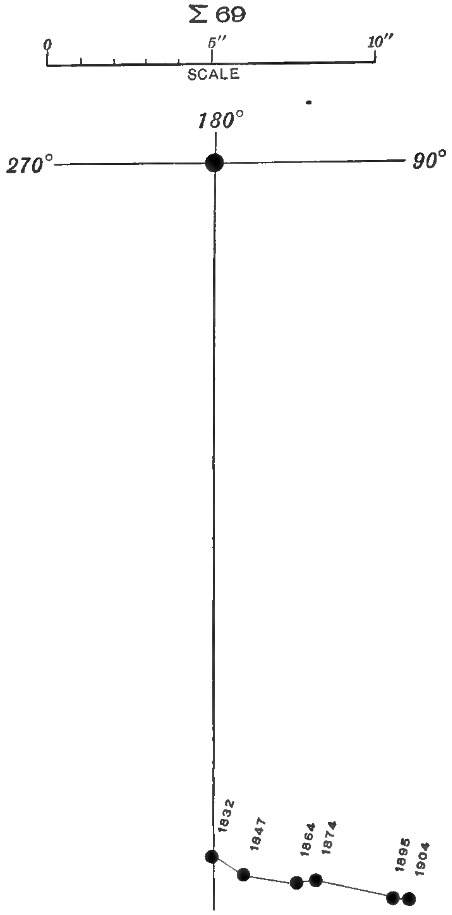
[Hd...β1...A (3465)...Doolittle (*Pub. Flower Obsy.* **I**)...Kustner (3821)...]

47 19 **471.** **O. Stone 4.** Both stars are given in the Washington catalogue, and noted as double in Cordoba Zones.

1892.86	10°3	5″57	2*n*	Gla
1902.85	12.1	5.70	2*n*	Scott

[Cin4...Cin6...Glasenapp (**II**)...Scott (*Brit. Ast. Asso.* **VI**, 368; **VIII**, 66)...Do (3798)...Scott (*Mon. Not.* **LXIV**, 52)...]

474. **Σ 69.** The change is from proper motion. $47^m\ 51^s$



1864.88	6°6	22″47	5*n*	⅃
1874.90	8.0	22.4	1*n*	Gl
1895.96	13.5	23.41	3*n*	A
1904.68	14.5	23.63	2*n*	β

[Ma (*F. S.* **II**)...WS...Gl...Flm...Sk...Δ (**II**)...A (3395)...β6...]

475. υ^1 *Cassiopeiae.* **β 1098.** Discovered with the 36-inch. The principal star has a proper motion of 0″106 in the direction of 221°2 (Auwers). With the position of 1889, and this proper motion, the distance of the small star, if fixed in space, should be 13″6 in the position-angle of 73° at the date of the last measure in 1898. 47 53

1896.80	74°4	12″87	1*n*	A	6...14
1898.60	74.0	13.18	2*n*	β	...14

[β (**XVI**)...β (2956)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (3465)...]

476. **Σ 72.** B is DM (38°) 139. Probably fixed. 47 59

1851.80	181°5	24″54	1*n*	Σ
1865.79	180.7	24.19	3*n*	Δ
1904.69	178.9	23.87	2*n*	β

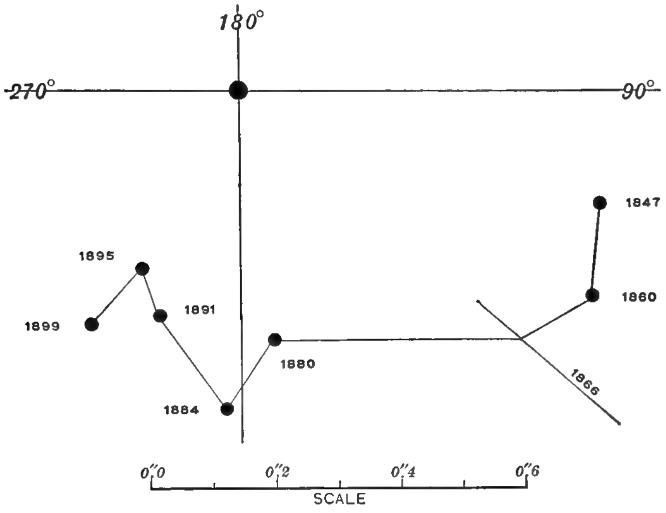
[Ma (*F. S.* **II**)...H (**IV**)...OΣ (**IX**)...⅃ (**II**)...β6...]

48^m 7^s **478.** **H** 3407. The angle in Scott is given 27°.0; probably an error in printing.

1877.77	126°.2	13″.23	2*n*	Cin⁴	8.2 . . . 8.2
1902.85	127.0	13.2	1*n*	Scott	

[Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LXIV**, 52) . . .]

48 14 **479.** 66 *Piscium.* OΣ 20. An interesting binary, though not of short period. The only orbit is by Glasenapp, using measures to 1888. He finds a period of 136.2 years. As the arc described is only 90°, the elements are necessarily very uncertain. The proper motion is 0″.017 in 246°.0 (Auwers). The measure in Hl (II) belongs to β 495. The following measures will show the general character of the motion:



66 Piscium. OΣ 20

1847.33	72°.8	0″.62	4*n*	OΣ
1860.34	59.9	0.67	3*n*	OΣ
1866.85	48.7	obl.	3*n*	Δ
1880.75	8.1	0.41	2*n*	β
1884.85	357.7	0.52	3*n*	Per
1891.66	341.0	0.39	3*n*	β
1895.39	332.0	0.33	2*n*	Lewis
1899.22	328.2	0.45	4*n*	Hu

[Ma (**XI**) . . . . Se . . . . Do (2322) . . . . Δ (1100, 2193) . . . . LM . . . Δ (**I**, pp. 109, 132) . . . . Perry (*Eng. Mech.* **XXXIX**, 11) . . . Per . . . Sk^3 . . . Per (2749) . . . T (2899) . . . β^2 . . . β^3 . . . β (3114) . . . OΣ (**IX**) . . . β (*Pub. L. O.* **II**) . . . OΣ (**X**, p. 190) . . . Glasenapp (2940) (*Orbites, Cat. Poulkowa*) . . . Hl (**II**) . . . Lv (*Proc. Haverford Coll. Obsy.* 1891) . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Glasenapp (**II**) . . . Big (*Bul. Ast.* **XII**, 299) . . . Com (*Pub. Washburn Obsy.* **X**) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . . Lewis and Bowyer (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 494; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 789) . . .]

(See p. 1057)

48 31 **480.** Σ 74. Unchanged. The stars have a common proper motion, which is given as 0″.036 in 236°.0 (Battermann).

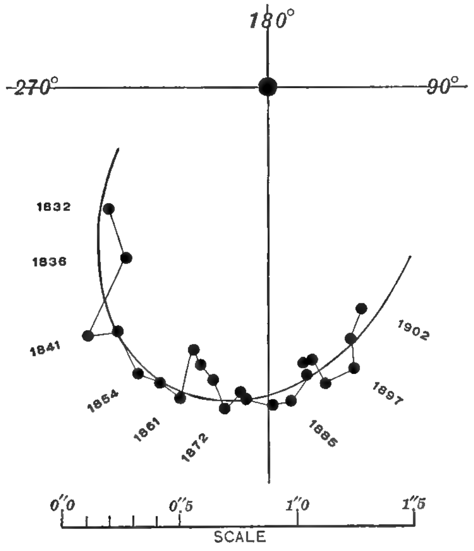
1866.06	300°.7	3″.09	3*n*	Δ
1902.81	301.4	3.19	3*n*	Do

[Ma (*F. S.* **I**) . . . Ma (**X**) . . . Se . . . Sk^3 . . . Δ (**II**) . . . Do (3930) . . .]

482. 36 *Andromedae.* Σ 73. A binary, but the time covered by the measures is insufficient at this time to determine the elements of the orbit. 48^m 32^s

The measures of at least another half century may be required to define the apparent orbit within reasonable limits. The ellipse, a portion of which is shown on the accompanying diagram, would give a period of about 140 years. Two orbits have been computed.

1872	Doberck	349.1 yrs.	*Trans. R. I. Acad.* XXV
1891	Lewis	137.5	*Mon. Not.* LI, 462



36 Andromedae. Σ 73

The system has a proper motion of 0″.128 in 103°.6 (*A. G. Berlin*).

1832.14	307°.8	0″.85	3*n*	Σ
1836.90	320.5	0.94	3*n*	Σ
1841.64	324.2	1.30	3*n*	OΣ
1846.78	328.6	1.21	1*n*	OΣ
1854.70	335.9	1.33	3*n*	OΣ
1858.04	340.1	1.33	4*n*	Ma
1861.74	344.4	1.36	1*n*	OΣ
1863.71	344.4	1.16	13*n*	Δ
1866.52	346.6	1.21	11*n*	Δ
1869.76	349.7	1.26	4*n*	Δ
1872.65	352.5	1.37	6*n*	Δ
1875.60	355.2	1.29	7*n*	Δ
1877.52	356.4	1.32	3*n*	Δ
1882.00	1.2	1.34	4*n*	Sp
1885.25	4.3	1.32	4*n*	Sp
1886.95	7.9	1.23	4*n*	Hl
1888.05	7.7	1.18	6*n*	Sp
1889.93	9.6	1.17	3*n*	Hl
1892.98	11.4	1.27	4*n*	Maw
1897.98	17.1	1.24	3*n*	A
1900.61	18.0	1.13	3*n*	A
1902.71	22.7	1.02	11*n*	Bowyer

[Pl . . . Fl . . . H^1 . . . H^2 . . . Da^3 . . . Da^4 . . . Se . . . Se (1614) . . . Se (*Comp. Rend.* **XLVIII**, 375) . . . Se^2 . . . Wn (1738) . . . Ma (**IX, X, XI, XIII, XV**) . . . Ma (*F. S.* **I**) . . . Δ (1100, 1256, 1473, 1572, 1735, 1886, 2077, 2192) . . . En (1673, 2663) . . . Ra (**XXI**) . . . Mh . . . WJ^2 . . . K . . . Wr . . . Bp . . . Hd . . . Newcomb (*Wash. Obsns.* 1867) . . . Gl . . . OΣ (**IX**) . . . Sp (2132) . . . Du . . . Bru . . . Pl . . . WS . . . WS^2 . . . Ba (**II, III, IV**)

...Nobile (*Acc. Sci. Nap.* Jan. 1875)...Kn...Hl (**I, II**)...Hl (*Wash. Obsns.* 1875, 1876, 1878, 1882)...Do (2052, 2196, 2240, 2242, 2433, 2989, 3378, 3680, 3930)...Do (*Observatory* **II**, 212)...Do (*Trans. R. I. Acad.* **XXV, XXIX**) ...Je (2324) ... Sk...Sk^{2} ... Hl (*A. J.* 265)...K (1519) ... Wn (**V**) ... Perry (*Eng. Mech.* **XXXIX**, 11)...Per...Per (2684, 2748)...Giacomelli (**I**) ... Maw (**I, II, III, IV**)....Lv^{1}....Δ (**I, II**)....Collins and Jones (*Proc. Haverford Coll. Obsy.* 1891, 1892)...Lewis (*Mon. Not.* **LI**, 462) orbit...Sp (**I, II**)...Sp (**II**, App)...Glasenapp (**II**)...Big...Big (*Bul Ast.* **XII**, 299)...Sk^{4}...Sk^{5}... Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)...Com (*Pub. Washburn Obsy.* **X**)...See (*A. J.* 359)...Morgan (*A. J.* 439)... Knorre (3300, 3518)... Coleman (*Mem. R. A. S.* **LIII**)...Solá (3679)...Gl (*Mon. Not.* **LXI**, 556)... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...Hu (*A. J.* 427)...A (*A. J.* 429)(*Bul. L. O.* No. 11)...Coleman (*Mem. R. A. S.* **LIV**)...Ra (**XLVII**...]

$48^m 49^s$ **484.** **Σ 75.** Probably without change.

1868.20	271°5	4″98	4*n*	Δ
1904.36	274.7	4.96	3*n*	β

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...Δ (**II**)...β^{6}...]

48 53 **485.** **β 500.** Discovered with the 18½-inch. Change doubtful.

1889.94	290°3	0″56	6*n*	Sp
1893.34	112.2	0.78	2*n*	W
1896.72	289.8	0.62	2*n*	Lv
1900.77	288.2	0.56	2*n*	A

[β (**X**)...β^{1}...Sp (**III**)...Lv (*A. J.* 407)...Wilson (   )...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower. Obsy.* I)...]

48 59 **486.** **H 629.** The only measures are by HΣ (XII).

AB	1885.83	71°4	10″92	2*n*
AC	1885.73	74.2	71.35	1*n*

49 9 **487.** **β 233.** Discovered with the 6-inch. Evidently without change.

1877.80	87°3	1″30	2*n*	Cin	8.0... 9.2
1891.77	92.0	1.36	2*n*	Col	... 9
1891.96	90.5	1.14	1*n*	β	8.0... 9.0
1897.75	90.0	1.46	1*n*	See	

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3114)...β (*Pub. L. O.* **II**)...Δ (**I**)... Cin^{4}...Collins (*Proc. Haverford Coll. Obsy.* 1891)...See (3495)...Do (3378, 3798)...]

49 28 **488.** γ *Cassiopeiae.* **β 1028.** The distant star was detected with the 18½-inch, and in measuring it with the 36-inch the close star was discovered. It should have been seen with the smaller telescope, as it was measurable with the 12-inch at Lick Observatory.

Auwers gives for the proper motion of the large star 0″027 in the direction of 134°3. If the companion does not share in this motion, the angle at the date of the last measures in 1898 should be 261°5 and the distance 2″33. As the measures appear to show no relative change, it is very probable that B is moving with the principal star, and that they constitute a physical system. The distance of C is increasing as it should from the movement of A. The computed place of C from the measures of 1879 and the proper motion of A is, 347°9: 52″65 for 1898.5, which is practically identical with the measures of that date.

The following are all the other measures:

A and B

1889.53	255°4	2″15	4*n*	β
1894.78	353.7	2.22	3*n*	Bar
1896.86	248.6	1.97	3*n*	A
1897.83	255.2	2.10	2*n*	Hu
1898.57	256.5	2.02	2*n*	β
1900.80	260.5	2.27	2*n*	Doo

A and C (= β 499)

1888.68	348°6	52″44	2*n*	β
1896.89	348.4	52.71	2*n*	A
1898.50	347.7	52.69	3*n*	β
1900.80	347.3	52.77	3*n*	Doo

[β (**X, XIV**)...β^{1}...β^{3}...β (2875, 2956) ... β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... Hu (*A. J.* 427)...A (3465)...Barnard (*A. J.* 447)...Doolittle (*A. J.* 547)...]

489. **β 1099.** This close and difficult pair was discovered with the 36-inch. It is a naked-eye star, 21′ *s* of γ *Cassiopeiae.* Rapid angular motion is clearly shown by the measures, and it may belong to the class of short period binaries. The following are all the measures: $49^m 34^s$

1889.57	270°2	0″15	3*n*	β
1891.64	282.2	0.12	3*n*	β
1894.72	289.5	0.09	3*n*	Bar
1898.57	307.3	0.26	2*n*	β
1899.53	312.6	0.23	3*n*	A
1901.43	324.3	0.11	2*n*	Bryant
1901.79	317.5	0.29	1*n*	β
1902.78	320.8	0.19	1*n*	Bryant
1903.80	325.8	0.19	1*n*	Bryant

[β (**XVI**)...β (2956, 3114)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Barnard (*A. J.* 447)...A (3638)(*Bul. L. O.* No. 11)... Bryant (*Mon. Not.* **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...β^{6}...] (See p. 1057)

490. **Howe 1.** Discovered by Howe at Cincinnati. 49 52

1886.40	111°9	1″86	4*n*	LM	8.3...8.5

[Cin^{5}...Cin^{6}...LM...] (See p. 1057)

493. **Espin —.** Discovered by Espin (*A. and A. P.* XII, 282) (*Brit. Ast. Asso.* III, 227). 50 :

494. From *Pub. Flower Observatory.* There is no pair in this place. It is really identical with 26 *Ceti* (No. 553). 50 :

495. **Arg. 3.** Double in *O. Arg. N.* The components are DM (59°) 150 and 149. The only measures are: 50 3

1892.77	203°2	21″24	3*n*	Es	
1901.79	202.3	20.73	2*n*	β	8.5...8.9

[Espin (*Brit. Ast. Asso.* **III**, 228)...β^{5}...] (See p. 1057)

497. μ *Andromedae.* **H 1057.** The nearest star, B, was added with the 18½-inch in measuring the H companion. The principal star has some proper motion. 50 6

Auwers	0″135 in 68°7
Bossert	0.173 in 73.2

H gives for AC, 111°0:30°± (1828+). The later measures are:

AC	1896.04	122°0	36″69	3*n*	A
	1901.80	122.2	36.87	2*n*	β
AB	1901.82	311.1	39.69	2*n*	β

The change is due to the movement of A. C is now the nearest.

[β 1...β 5...A (3395)...]

50^{m} 19^{s} **499.** **Σ 76.** No material change.

1869.66	197°2	3″11	3*n*	Δ
1904.68	200.0	2.78	2*n*	β

[Ma (*F. S.* **I, II**)...Ma (**XI**)...Δ (**II**)...Cin 6...β 1...β 6...]

50 34 **500.** **Hn 4.** The only other measure is:

1888.86	123°6	1″25	3*n*	Com

[β 4...Com (**VI**)...]

51 27 **504.** **Σ 77.** Place from H (VI). Since identified as DM (26°) 158. Apparently fixed.

1866.90	119°3	9″96	3*n*	Δ
1904.70	119°5	10.31	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV, VI**)...Δ (**II**)...*Annals Toulouse Obsy.* **III**...β 6...]

51 42 **505.** **H 2004.** Probably fixed.

1857.96	241°9	3″25	2*n*	J	
1877.79	241.4	3.17	4*n*	Cin	6.7...9.0
1897.80	239.2	3.88	1*n*	See	6.5...9.7
1900.77	242.5	3.13	1*n*	Solá	

[WJ...J 2...J 3...Hd...Cin 3...Cin 4...See (3495)...Solá (3679)...]

51 43 **506.** **Knott 1.** The principal star is a variable of short period, discovered in 1880 by Ceraski. The companions were detected by Knott. The later measures are:

AB	1899.80	62°4	13″88	4*n*	Doo
AC	1899.80	320.4	21.04	4*n*	Doo

[Kn (2346, 2359) (*Mon. Not.* **XLI**, 34) ... Copeland (*Mon. Not.* **XLI**, 216)...β 4...Doolittle (*Pub. Flower Obsy.* **I.**)...]

51 46 **507.** **Wn 1.** Discovered by Winnecke. The only measures since 1863 are:

1901.73	129°2	5″40	2*n*	β

[Wn (1738)...β 5...]

51 55 **508.** **β 302.** Discovered with the 6-inch. A naked-eye star in *Pisces.* The angle appears to be increasing.

1883.53	94°3	0″82	5*n*	En
1887.53	97.0	0.61	6*n*	Sp
1888.32	99.9	0.89	7*n*	HΣ
1889.02	97.1	0.66	8*n*	Sp
1898.01	101.0	0.58	2*n*	Brown
1903.58	103.0	0.58	3*n*	Bowyer

[β (**VI**)...β (2062)...Δ (**I**)...En (2742)...OΣ (*Poulkowa Obsns.* **X**)...J. J. M. Perry (*Eng. Mech.* **XXXIX**, 11)...Sp (**III**)...Brown (3645)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**) (*A. J.* 547) ... Bowyer (*Mon. Not.* **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...]

(See p. 1057)

513. **S 390.** Not in *O. Arg. S.*, but noted "double" in Wash. Transit Zones from which the place here is taken. Se¹ gives 33°2:6″36 (1855.95). It is there, as in Se³, called H 1138, but that is simply the reference number of measures in *Cape Observations.* The angle of 86°8 in Se¹ appears to be a misprint for 36°8, unless the measure belongs to some other pair. The magnitudes there are 7...7.2. There is no indication of change. 52^{m} 11^{s}

1877.80	214°2	6″36	3*n*	Cin	7.2...7.3
1892.82	215.2	5.95	2*n*	Gla	7.3...7.5
1895.84	215.2	6.27	3*n*	Scott	
1897.77	214.7	6.66	3*n*	Doo	

[P 1...J 2...WJ...H (**V**)...H 2...Se...Se 1...Se 3...Pt...Gl. (*Ast. Reg.* **XVIII**, 141)...Wilson (Cin 10)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)... Scott (*Brit. Ast. Asso.* **VI**, 368) (*Mon. Not.* **LIX**, 427; **LXIV**, 52) ...Do (3378, 3798)...Doolittle (*Pub. Flower Obsy.* **I**)...Solá (3563)...]

514. **A. G. 10.** Noted as double in the *A. G. Berlin.* 52 17

1902.81	111°3	3″88	3*n*	Cg

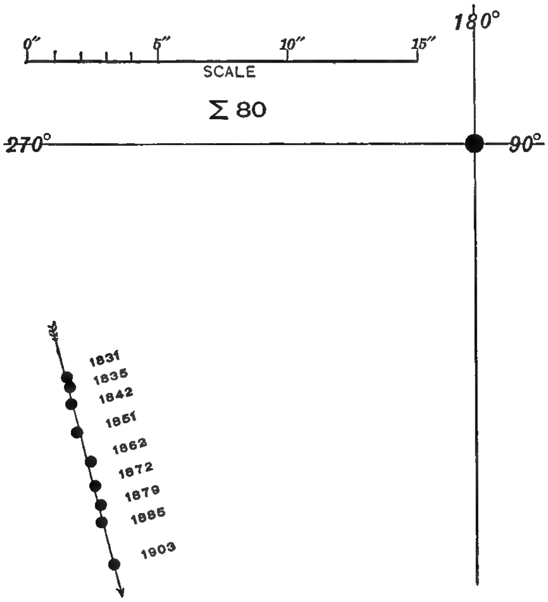
[Hu (*Bul. L. O.* No. 44)...Cogshall (*A. J.* 546)...]

518. **Σ 78.** Probably fixed. 52 53

1868.01	244°9	5″00	4*n*	Δ
1892.99	248.3	4.56	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**V**)...Se...Se 3...Δ (**II**)...Glasenapp (**II**)...]

519. **Σ 80.** (= **S 391.**) This is an optical pair, the change being due to proper motion. The movement of the larger star is given: 53 15



Glasgow	0″193 in 229°6
A. G. Nico.	0.127 in 225.0

It is evident from the accompanying diagram, that the direction of motion has a smaller position angle. The measures indicate a relative motion of A of 0″100 in 195°, so that if the meridian value is correct, the smaller component must have a motion of its own.

The following representative measures are shown:

1831.53	299°5	18″14	3*n*	Σ
1835.83	300.6	18.37	3*n*	Σ
1842.84	302.4	18.69	2*n*	OΣ
1851.22	305.5	19.01	2*n*	OΣ
1863.83	309.2	19.36	6*n*	Δ
1872.68	311.5	19.73	1*n*	Δ
1879.75	313.5	20.19	3*n*	Hl
1885.93	314.9	20.57	3*n*	Hl
1903.81	319.2	21.24	3*n*	β

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...K...J^{2}...J^{3}...Bp...Ra (**XXIX, XXX**) WJ...Δ (1100, 1473, 1735)...Δ (**I, II**)...Gl...Du...Flm...H (**V, VII**)...WS WS^{2}...Hd...K (1519)...Goldney (2257)...Pl...Je (2449)...Sk...Pt...Per ...Per (2748)...En...En (1673, 2663)...Do (2989, 3930)...Do (*Trans. R. I. Ac.* **XXIX**, Part 13)...Peters (2209)...T (2898)...Hl (*Wash. Obsns.* 1885)...H^{1} (**I, II**) ... OΣ (**IX**) ... Giacomelli (**I**) ... Glasenapp (**II**)... Solá (3497)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...Sk^{5}...Coleman *Mem. R. A. S.* **LIV**)...β^{6}...]

$53^{m}\ 15^{s}$ **520.** Σ 79. *Andromedae* 164. (= H̥ N. 45 = **Sh** 11.) Fixed.

1869.66	192°0	7″73	5*n*	Δ
1883.87	192.9	7.84	2*n*	Per
1898.42	192.5	7.52	8*n*	Coleman

[Ma (*F. S.* **I**)...H^{1}...H (**V**)...Da^{1}...Da^{2}...Ra (**XXII**)...P^{1}...Wr...Du... Per ... Per (2684) ... Ma (324) ... Δ (1204) ... Δ (**I, II**) ... Giacomelli (**I**) ... Glasenapp (**II, III**)...Bryant (*Mon. Not.* **LX**, 494)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

53 44 **524.** **Ma** 1. Discovered by Madler, and sometimes measured for OΣ 21 which is some distance following. The later measures show no change.

1879.19	35°2	0″98	2*n*	β	
1889.79	37.1	0.99	1*n*	HΣ	
1891.54	35.3	0.98	3*n*	β	7.9... 8.4
1899.41	33.8	0.93	4*n*	Hu	7.5... 8.0

[Ma (**XIII**)...β (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...Bryant (*Mon. Not* **LXI**, 487)...HΣ (**XII**)...]

53 53 **525.** **H** 1063. "The first of a lozenge." By another observation P = 285°3. Examined and found to be the *p* of four small stars; too faint to be of much interest.

53 56 **526.** Σ 81 *rej.* The only measures are:

1904.57	67°3	17″67	2*n*	β^{6}	7.5...10.3

53 56 **527.** β 867. Discovered with the 18½-inch. Without change. The later measures are:

1889.00	172°2	0″98	1*n*	Lv
1889.93	174.6	1.00	3*n*	Sp
1900.78	176.3	1.02	2*n*	Doo

[β (**XIII**)...β^{3}...Lv^{1}...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

528. Σ 82. Unchanged. $54^{m}\ 26^{s}$

1866.51	306°8	1″72	3*n*	Δ
1897.72	305.3	2.09	3*n*	Doo

Doolittle measures two more distant stars:

AC	1897.72	34°0	74″99	3*n*	Doo	
CD	1897.72	105.7	10.90	3*n*	Doo	10.0...11.0

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...Se...Hd...Cin^{6}...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

531. β 234. Discovered with the 6-inch. C is O. Arg. S. 565. Apparently fixed. Some of the later measures are: 54 36

A and B

1877.78	330°5	4″76	2*n*	Cin
1887.97	332.2	4.70	2*n*	Lv
1892.89	332.6	4.41	2*n*	Gla
1898.70	331.8	4.58	3*n*	Cg
1898.88	331.4	4.54	1*n*	β

A and C

1892.89	132°1	60″66	2*n*	Gla
1898.89	131.6	60.41	2*n*	β

[β (**V**) ... β (*Mon. Not.* **XXXV**, 31)(*Pub. Y. O.* **I**)...Δ (**I**)...Cin^{3}...**Cin**^{4}... Lv^{1}...Wilson (Cin^{10})...Glasenapp (**II**)...Cogshall (*A. J.* 478)...]

533. **A. G.** 11. Measures from *A. G. Leipzig.* 54 44

1902.85	4°1	52″33	3*n*	Miller

534. **A. G.** 12. Noted as double in *A. G. Berlin.* Measures from the Kirkwood Observatory. 55 24

[Miller (*A. J.* 546)...]

537. β 1161. Discovered with the 36-inch. Some change is probable. 55 53

1897.90	331°0	0″5 ±	2*n*	A
1898.74	330.5	0.57	2*n*	β

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (*A. J.* 429)...]

538. **H** 2010. "Duplex" in *O. Arg. N.* Fixed. 55 54

1879.61	270°8	10″03	1*n*	Cin	8.0... 9.5
1903.82	270.0	9.90	2*n*	β	8.5... 9.0

[Cin^{6}...Espin (3717)...β^{6}...]

539. **Ho** 493. Discovered by Hough. Without change. 56 4

1903.91	19°5	33″70	2*n*	β

[Ho (3557)...β^{6}...Doolittle (*A. J.* 547)...] (See p. 1057)

540. **Hn** 62. Discovered by Holden. No other measures (*Pub. Washburn Obsy.* II, VI). (See p. 1057) 56 5

541. OΣ 21. Dembowski found this pair too uncertain to measure in 1864-65, and single in 1878. I found what I supposed to be this pair with the Hanover 9.4-inch in 1874, 56 7 and estimated the distance 0″8. In August 1875 it was found independently with the 6-inch, and noted well separated. There is another pair a little more than 2^m *p* this, first observed by Madler (No. 524), which has frequently been taken for OΣ 21, and it is possible that my observations belong to that star. In measuring the Madler pair in 1878–79 (erroneously called OΣ 21) I failed to find any other pair in the vicinity.

OΣ has four measures of his pair:

1845.86	180°9	0″69	1*n*	OΣ
1846.11	178.4	0.54	1*n*	OΣ
1847.69	173.0	0.62	1*n*	OΣ
1851.72	176.0	0.49	1*n*	OΣ

In 1889 and 1894 HΣ found it single. In 1898 Hussey measured a star, supposed to be this, his measures agreeing with the positions in OΣ.

1898.78	160°7	0″74	1*n*	Hu

He states that on many occasions subsequently, and particularly in 1900 and 1902, he failed to detect any evidence of its being double. Still later Aitken, with the 36-inch, found that this star was after all an exceedingly close pair. His measures are:

1904.54	1°0	0″22	4*n*	A

The measures of OΣ show no sensible change, and it is difficult to reconcile all the results, negative and otherwise. It may be in very rapid motion. Some of the references below relate to the Madler pair.

[OΣ (**IX**)...Ma (**XIII**)...Sk³...*Δ* (I, p. 227)...β (3114)...β (*Pub. L. O.* **II**)... Bryant (*Mon. Not.* **LXI**, 486)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

(See p. 1057)

$56^m\ 10^s$ **542.** 39 *Andromedae.* **H 1064.** The only complete measure is:

1902.21	3°3	20″56	2*n*	β	...12.4

[β¹...Cin⁶...β⁶...]

56 14 **543. β 396.** Discovered with the 6-inch. A naked-eye star near γ *Cassiopeiae.* The components have a striking difference in color; ⅃ gives, *white : light blue.* Thus far there is no change in angle or distance.

1879.40	65°8	1″21	4*n*	β
1881.63	67.5	1.15	3*n*	β
1885.69	66.0	1.21	2*n*	HΣ
1888.72	66.8	1.25	4*n*	β
1889.53	66.4	1.28	3*n*	β
1902.71	66.9	1.27	3*n*	Doo

[β (**VII**)...β¹...β³...β⁴...β (2103, 2875, 2956)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...*Δ* (I)...HΣ (**XII**)...Doolittle (*A. J.* 547)...]

56 30 **545. Σ 83** *rej.* Measures from H (IV).

1900.32	313°5	22″09	3*n*	Espin

[H (**IV**)...Espin (*Mon. Not.* **LXII**, 531)...]

56 33 **547. See 10.** Discovered by See at the Lowell Observatory. The principal star is L 1823.

1898.84	324°0	4″33	3*n*	Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 505)...]

(See p. 1057)

551. Ho 213. Discovered by Hough with the 18½-inch. $57^m\ 21^s$

1892.74	181°0	0″25±	1*n*	Ho
1901.86	203.0	0.34	3*n*	Doo

[Ho (2977, 3234, 3558)...Doolittle (*A. J.* 547)...]

553. 26 *Ceti.* **Σ 84.** (=Ħ **IV. 83 = Sh 12.**) This star has some proper motion: 57 38

Bossert	0″155 in 104°9
A. G. Nico.	0.101 in 109.0
Porter	0.114 in 106.3

This movement belongs to both components.

1851.80	253°6	15″76	1*n*	Σ
1865.75	252.2	16.02	3*n*	*Δ*
1887.98	254.6	16.02	2*n*	Eng
1892.94	253.0	16.59	2*n*	Gla
1903.87	253.5	15.96	3*n*	β

[Ma (*F. S.* **II**)...Ma (**XII, XIII**)...Ḣ (**VII**)...J³...Ra (**XXI**)...WS...Gl... OΣ (**IX**)...Se¹...T (2898)...Engelhardt (*Obsns. Ast.* **II**)...*Δ* (**II**)...Glasenapp (**II**)...Coleman (*Mem. R. A. S.* **LIII**)...Doolittle (*Pub. Flower Obsy.* **I**, p. 19)...β⁶...

554. Hu 518. Discovered by Hussey (*Bul. L. O.* No. 27). 57 48

555. A 204. Discovered at Mt. Hamilton. 58 19

[A (3784) (*Bul. L. O.* No. 16)...]

556. Σ 85 *rej.* The only measures are· 58 20

AB	1873.93	159°7	26″7	1*n*	WS	8 ... 9.5
	1902.67	159.5	28.71	3*n*	β⁶	8.2...10.2
AC	1902.67	117.3	33.90	3*n*	β⁶	...10.8

559. H 1067. H (VI) 335°9 : 12″± : 10...10. As there seemed to be an error of 100° in one, it was measured: 58 40

1903.86	237°8	15″97	2*n*	β⁶	9.6... 9.6

560. Σ 86. (=Ħ **III. 73 = S 392.**) Slow retrograde motion in P from proper motion. The distance is slowly increasing and the angle diminishing. The distance in Ħ is too large. 58 43

1783.08	180°6	14″83	1*n*	Ħ
1832.22	171.0	12.12	3*n*	Σ
1843.85	167.8	12.34	2*n*	OΣ
1863.96	162.8	12.59	5*n*	*Δ*
1876.06	160.0	13.02	2*n*	Hl
1885.93	159.2	13.21	3*n*	Hl
1902.36	155.7	13.31	3*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...K...WJ...WJ²...Bp...Hd...Gl...Pt... Da³...OΣ (**IX**)...Ba (**II, III, IV**)...⅃ (1473)...Pl...WS...WS²...Flm... Sk²...Do (2196)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...*Δ* (**II**)...Cin³...Cin⁴...Cin⁶...K (1519)...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Glasenapp (**II**)...β (*Ast. and A.-P.* **XIII**, 19)...Sk⁴...Do (3378)...Chofardet (3450)...Solá (3563)...Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

$58^m\ 44^s$ **561.** 72 *Piscium.* **H 1068.** The 18 m companion was readily seen with 6-inch. The large star has a proper motion of 0″.050 in 344°.8 (Porter).

1877.82	263°.1	54″.81	1*n*	β
1896.13	262.9	55.24	3*n*	A

[β1...A (3395)...] (See p. 1057)

58 54 **562.** **β 735.** Discovered with the 6-inch at Mt. Hamilton. There is no evidence of change. This star had been previously seen by the Cincinnati observers. The magnitude of A is 6.5 in Gould.

1891.83	220°.3	8″.68	3*n*	β
1896.76	219.4	8.37	2*n*	See
1896.87	220.0	8.43	1*n*	Hu

[β (**XI**)...β2...β (3114)...β (*Pub. L. O.* **I, II**)...Cin4...Hu (*A. J.* 397)...See (3495)...Doolittle (*Pub. Flower Obsy.* **I**)...]

58 53 **563.** **H 10.** Probably fixed. A in DM is 9.1 m.

AB	1879.66	313°.0	4″.76	2*n*	Cin	8.2...9.8
	1903.86	314.2	4.87	2*n*	β	9.3...9.6
AC	1879.66	55.2	8.80	2*n*	Cin	...9.0
	1903.86	56.7	8.68	2*n*	β	...9.5

[Cin6...*A. G. Leipzig* **I**, p. 206...β6...]

59 : **565.** **Hd 42.** No double found by Miller at the Kirkwood Observatory, 1903.88.

59 1 **566.** **H 1066.** "Large star *ruddy;* small one more so."

1903.82	295°.0	7″.46	2*n*	β	8.7...11.5

[Espin (*Mon. Not.* **LXIV**, 678)...β6...]

59 7 **567.** **A. G. 14.** Noted as double in the *A. G. Berlin.*

1902.79	204°.1	0″.84	2*n*	Cg

[Hu (*Bul. L. O.* No. 44)...Cogshall (*A. J.* 546)...]

59 9 **568.** **Σ 87.** Perhaps a little change in the angle.

1866.01	196°.4	6″.43	3*n*	Δ
1892.81	196.6	6.50	2*n*	Gla
1902.77	198.7	6.40	2*n*	Do

[Ma (*F. S.* **I, II**)...Ma (**XI, XII, XIII**)...H1...Se...Se2...Gl...Flm...Pt...Δ (**II**)...Pt...Δ (**II**)...Sk3...Jones (*Proc. Haverford Coll. Obsy.* 1891–92)...Glasenapp (**II**)...*A. G. Leipzig*, p. 206...*Annals Toulouse Obsy.* **III**...Do (3930)...]

59 15 **570.** ψ1 *Piscium.* **Σ 88.** (= **Ⱨ IV. 9** = **Ⱨ IV. 116** = **Sh 14.**) Without change. *A. G. Berlin* gives the proper motion of A as 0″.033 in 117°.0, and B 0″.020 in 136°.1, but the components appear to be moving together.

1866.16	160°.3	30″.01	3*n*	Δ
1883.86	160.1	29.99	3*n*	Per
1888.54	159.9	30.29	6*n*	Gla
1903.12	160.2	30.00	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Ma (304, 324)...H (**V**)...Ba (**II**)...Bp...Se1...Ra (**XXI**)...Δ (1204)...Δ (**I, II**)...OΣ (**IX**)...Gl...Du...Pk...Je (2324)...Per...Per (2684)...Sk3...Big...P. Smythe (*Mon. Not.* **XXIII**, 8)...Glasenapp (**II, III**)...Solá (3563)...Coleman (*Mem. R. A. S.* **LIII**)...Do (3680, 3930)...*Annals Toulouse Obsy.* **III**...]

571. **Ho 5.** No measures of this close pair. $59^m\ 18^s$

[Ho (2778, 3558)...] (See p. 1057)

572. **β 1228.** Discovered with the 18½-inch in 1884, but not given in the catalogues of that time. No material change. 59 30

1895.88	268°.1	0″.51	1*n*	L
1896.81	265.1	0.60	1*n*	A
1897.86	266.8	0.69	1*n*	L
1897.98	265.2	0.86	1*n*	Bow
1898.87	275.7	0.89	3*n*	Bow
1898.94	268.5	0.80	1*n*	A
1900.33	272.4	0.81	5*n*	Doo

[β (**XVIII**)...β (3113)...β (*Pub. L. O.* **II**)...Lewis and Bowyer (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXII**, 383; **LXIV**, 790)...A (3465, 3584)...Doolittle (*Pub. Flower Obsy.* **I**) (*A. J.* 547)...]

573. σ2 *Piscium.* **S 393.** (= **Ⱨ V. 16** = σ 23.) If any change in B, it is due to proper motion. The measures of this from Ⱨ; only estimates in S. The proper motion of **A** is 0″.120 in 185°.8 (Auwers). 59 35

AB	1851.57	293°.1	55″.73	3*n*	OΣ
	1879.27	293.7	55.95	2*n*	β
	1885.95	293.3	56.18	5*n*	Eng
	1904.67	294.0	56.28	2*n*	β
AC	1904.67	233.6	138.70	2*n*	β

[Flm...β3...Engelhardt (2785) (**II**)...OΣ (**X**, p. 2)...β6...]

574. 77 *Piscium.* **Σ 90.** (≐ **Σ 2 App. I** = **Ⱨ IV. 63** = **OΣ (App) 10** = **Sh 13.**) Fixed. Common proper motion: 59 37

Auwers	0″.120 in 185°.7	
Porter	0.117 in 180.0	

1864.75	82°.9	32″.78	4*n*	Δ
1887.92	82.4	32.92	2*n*	Eng
1888.83	82.4	32.53	2*n*	Gla
1904.70	83.2	32.59	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...P1...Ma (324)...Ra (**XXI, XXVIII, XXXV, XXXVI**)...Bp...Ba (**II**)...Gl...WS...H (**V**)...Pl...Maiebckato (*Obsns.* 1892)...Schur (2255)...Je (2329)...OΣ (**IX, X**)...Engelhardt (**II**)...Δ (**II**)...Glasenapp (**II, III**)...Chofardet (3450)...*Annals Toulouse Obsy.* **III**...β6...]

576. *Cassiopeiae* 106. **Ⱨ IV 66.** There is a small error in the place of Ⱨ. This star is L 1901. The magnitude in DM is 6.3. 59 59

1879.78	75°.2	22″.83	1*n*	Cin	
1900.56	75.7	22.58	3*n*	Es	6.2...10.5

[Cin6...Espin (3717)...]

578. **Σ 89** *rej.* "Duplex" in *O. Arg.*, Cl. II. The only measures are: 0 13

1879.75	14°.8	16″.14	1*n*	Cin6	8.5...9.0

579. **H 632.** The only measures are: 0 20

1900.72	121°.9	13″.99	2*n*	β6	10...11

$0^{m}\ 25^{s}$ **580.** **OΣ (App) 11.** The smaller star is $W^{2}\ 0^{h}$. 1486.

1887.11	158°.6	62″.64	5*n*	Franz

[Δ (I)...Franz (3080)...]

0 33 **581.** **Doo 2.** Discovered by Doolittle (*Pub. Flower Obsy.* I).

0 38 **582.** **H 2016.** In measuring H 632 (No. 579) I looked for the pair twice; but could not find anything to agree with the description in H.

0 40 **583.** **β 501.** Discovered with the 18½-inch. No sensible change.

1891.94	31°.3	2″.73	3*n*	β	8.1...11.5
1898.64	28.4	2.80	3*n*	Cg	7.2...11.8

[β (X)...β1...β (3114)...β (*Pub. L. O.* **II**)...Cogshall (*A. J.* 478)...]

0 46 **584.** **OΣ 22.** Without change. The principal star has a proper motion of 0″.031 in 71°.2 (Battermann).

1880.94	197°.7	8″.51	3*n*	β
1898.78	198.0	8.51	3*n*	Hu

[OΣ (**IX**)...Δ (I)...β3...Hu (*Pub. L. O.* **V**)...]

0 54 **587.** **β 397.** The nearest companion was found with the 6-inch, and the other added with the 36-inch. These stars appear to be relatively fixed. The double star H 2015 has the same R. A., but is 1° *n* of this pair. There is no such pair in H's place, and there is certainly an error of 1° in his declination, making it identical with this pair. The description in H is: 146°.2 : 10″± : 8.9...12.

		A and B			
1891.70	141°.9	8″.70	3*n*	β	
1893.56	142.9	8.54	3*n*	W	
1898.63	142.6	8.86	2*n*	β	
		A and C			
1898.63	65°.4	16″.63	2*n*	β	...12.5

[β (**VII**)...β (3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* I)...Δ (I)...Wilson(   )...]

1 ± **590.** **Lamont 2.** From *Annalen Stern. Munchen* XVII. I looked for this in 1900 and again in 1902, but failed to find anything agreeing with the description.

1 2 **591.** *Ceti* 160. **Σ 91.** (= S 394.) There is a little change in the angle, but the distance has remained nearly constant.

1867.72	322°.5	3″.87	4*n*	Δ
1877.81	321.3	3.92	4*n*	Cin
1892.82	318.5	3.67	2*n*	Gla
1894.88	321.9	3.86	2*n*	Collins
1901.90	320.1	4.15	2*n*	Do

[H1...Ma (**X, XI, XIII, XV**)...Wn (1738)...Ra (**XXV, XXXIII**)...Ma (*F. S.* **I**)....Hd....Gl....Se....Se2....Se3....WS....WS2....Sk2....Sk5....Wn (**V**)...Je (2449)...Sp (**II**)...Do (2307, 2989, 3378, 3798)... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Δ (1011, 2194)...Δ (I, **II**)...Δ (*Mem. Accad. Sci.*)...Cin3...Cin4...Lv1...LM...Ferr...Pt...Jones (*Proc. Haverford Coll. Obsy.* 1892)...T (2991)...Glasenapp (**II, III**)...Collins (*A. J.* 378)... Solá (3497, 3563)...Scott (*Mon. Not.* **LIX**, 427)...Maw (**III**)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...]

594. **β 1292.** Discovered with the 40-inch (β^{5}). $1^{m}\ 35^{s}$

595. **A. C. 13.** (AC = **H** 2018 = Σ 92 *rej.*) A close and difficult pair discovered by Alvan Clark. It is not among those measured by Da (*Mon. Not.*, XX, 54). In the preparation of this catalogue the agreement of the place with that of H 2018 was noticed, and the close pair observed, which was found to be the larger star of H's wide pair. That had been previously observed as Σ 92 *rej*, given in *Cat. Nov.* as Cl. IV, 8...10-11, and subsequently rejected in *Mens. Micr.* H underrated the principal star in calling it 9m. It is 7.5 in DM, and 8½ in L. I found it about 8m in 1875. 1 59

The only other measures are:

		A and B				
1878.84	256°.2	0″.45	1*n*	β		
1897.70	250.3	0.38	2*n*	Doo	8	... 8
1904.52	253.4	0.51	2*n*	A		
		AB and C				
1876.79	359°.4	15″.33	2*n*	Δ		...11.7
1878.84	359.1	15.44	1*n*	β		...10.8
1897.71	359.0	15.63	3*n*	Doo		

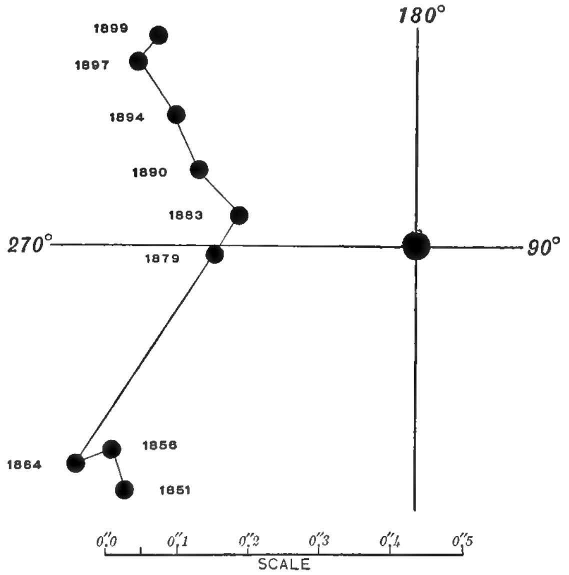
[Δ (I)...β3...Doolittle (*Pub. Flower Obsy.* I)...]

597. **β 502.** Discovered with the 18½-inch. Unchanged. 2 13

1892.00	305°.6	3″.24	2*n*	β
1900.77	305.6	3.31	3*n*	Doo

[β (X)...β1...(3114)...β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* I)...]

600. *φ Andromedae.* **OΣ 515.** A binary in slow retrograde motion. It was noted as single by ⅃ in 1867, but the measures since show that this could not have been the fact. It has recently become much closer, and the angular motion 2 32



φ Andromedae. OΣ 515

correspondingly increased. The system has a proper motion of 0″037 in 251°3 (Auwers).

1851.51	309°9	0″53	4*n*	OΣ
1856.87	303.9	0.51	3*n*	OΣ
1864.70	302.6	0.56	2*n*	OΣ
1879.05	272.4	0.28	3*n*	β
1883.84	260.3	0.25	7*n*	En
1890.59	250.8	0.32	3*n*	β
1894.76	242.4	0.19	2*n*	Bar
1897.98	236.4	0.23	3*n*	A
1899.56	231.0	0.23	3*n*	A

[OΣ (**IX**) (**X**, p. 197)...Δ (**I**, p. 230)...Sk3...β1...β3...β (3048, 3141)...β (*Pub. L. O.* **II**)...En (2678)...Flm...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)... Barnard (*A. J.* 447)... Hu (*A. J.* 427)... Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Sk5...A (3638) (*A. J.* 429) (*Pub. A. S. P.* **XII**, 31) (*Bul. L. O.* No. 11)...]

(See p. 1057)

2m 32s **601.** 31 *Cassiopeiae.* **H IV. 16.** Looked for on one occasion with 6-inch and no companion seen. Nothing found likely to be H's pair nearer than ψ *Cassiopeiae*. Also examined with the 40-inch in 1902, and no companion seen within 1′ distance. The proper motion is small:

Schroeter	0″051 in 141°0
A. G. Chris.	0.033 in 133.8

2 45 **602.** **Hu —.** Single measure, and quadrant not certain, so the position-angle may be 321°4. (See No. 12829)

2 54 **603.** **β 868.** Discovered with the 18½-inch. Unchanged.

1891.70	233°7	9″25	2*n*	β	7.9... 9.3
1898.79	233.4	9.15	1*n*	β	8.0...10.3

[β (**XIII**)...β3...β (3113)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

3 0 **605.** **β** *Andromedae.* **Barnard 1.** Several distant stars, all too remote to be of any special interest. The large star has a proper motion of 0″196 in the direction of 115°4 (Auwers). The nearest star by Barnard with the 40-inch.

[β3...β (*Mon. Not.* **XL**, 505)...Pk...Barnard (*A. J.* 447)...]

3 2 **608.** **A. G. 15.** Noted as double in *A. G. Lund.* Measures by β6.

3 2 **609.** **OΣ 23.** Noted "duplex, Cl. III" in *O. Arg. N. A. G. Harvard* gives the components different proper motions, but there has been no relative change:

A = 0″053 in 270°0
B = 0.113 in 207.8

1867.64	191°7	14″44	4*n*	Δ
1898.80	192.0	14.76	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Ma (**XIII**)...Du...Ba (**I**)...Hu (*Pub. L. O.* **V**)...]

3 4 **610.** **H 2021.** "A violent suspicion that this star is a close double." Looked for with the 6-inch (1876) but no double found. In 1891 this region was examined with the 36-inch, and no double star found in this place. H was certainly mistaken.

[β (*Mon. Not.* **XXXIV**, 370)...β (3114) (*Pub. L. O.* **II**)...]

611. **Innes 262.** Discovered by Innes (*A. N.* 3501) (*Mon. Not.* LXI, 578). 3m 9s

612. *Piscium* 201. **β 303.** Discovered with the 6-inch. Naked-eye star, Heis 6.7 m. The measures show no change in either angle or distance. Lalande 2046. Some of the later measures are: 3 10

1877.08	104°6	0″56	2*n*	Hl
1883.21	286.3	0.71	5*n*	En
1887.51	285.0	0.55	6*n*	Sp
1887.92	103.0	0.61	4*n*	Hl
1889.00	285.4	0.57	8*n*	Sp
1891.96	284.8	0.71	2*n*	β
1895.91	285.7	0.62	3*n*	Lewis
1897.88	280.1	0.64	3*n*	Bowyer
1897.89	286.2	0.49	2*n*	Lewis
1898.92	280.9	0.64	3*n*	Bowyer

[β (**VI**)...β (2062, 3114)...β (*Pub. L. O.* **II**)...Δ (**I**)...Hl (**I, II**)...En (2678)... Perry (*Eng. Mech.* **XXXIX**, 11)....OΣ (**X**)....HΣ (**XII**)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **I**) ...Maw (**IV**)....Gr. Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 494; **LXI**, 486; **LXII**, 383)...]

614. **β 235.** (C*c* = **OΣ 24**.) The close pair, and the minute companion to B, were discovered with the 6-inch. There is a slow advance in the angle of A*a*, with little or no change in the distant stars. 3 29

A and *a*

1878.65	76°9	0″84	1*n*	β
1883.75	78.5	0.59	6*n*	En
1888.56	83.7	0.63	5*n*	Sp
1889.53	86.1	0.79	3*n*	β
1891.68	86.0	0.71	3*n*	β
1892.88	84.0	0.87	3*n*	Jones
1897.84	87.6	0.86	3*n*	A
1898.72	91.1	0.83	3*n*	Hu
1903.95	92.6	0.87	1*n*	Bowyer

B and *b*

1898.54	78°7	8″64	2*n*	β

C and *c* (= OΣ 24)

1845.73	46°9	7″1 ±	2*n*	Ma
1868.05	48.9	7.99	3*n*	Δ
1878.65	47.2	8.13	1*n*	β
1898.54	47.6	8.03	2*n*	β

A and B

1884.08	286°9	43″20	5*n*	Franz
1898.54	286.1	43.43	2*n*	β

A and C (= OΣ (App) 12)

1868.05	66°9	60″86	3*n*	Δ
1883.48	66.7	60.06	6*n*	Franz
1886.06	67.1	60.45	3*n*	Eng
1898.54	67.4	60.01	2*n*	β

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β (2956, 3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Δ (**I**, pp. 133, 315)...Δ (2086)...OΣ (**IX**)...Ma (**XIII**)... En (2678).... Franz (2649).... Engelhardt (2785)(*Obsns. Ast.* **II**).... Jones (*Proc. Haverford Coll. Obsy.* 1892)...A (*A. J.* 429)...Sp (**III**)...Hu (*Pub. L. O.* **V**) (*Bul. L. O.* No. 44)...Renz (*Bul. St. P. Acad.* 1892)...Doolittle (*A. J.* 547)...Gr. Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...]

$3^m\ 32^s$ **615.** **Hu 602.** Discovered by Hussey (*Bul. L. O.* No. 57).

3 46 **617.** **β 2.** Discovered with the 6-inch. Without change.

1891.97	155°9	2″25	1*n*	β	8.7... 9.0
1900.77	155.7	2.28	3*n*	Doo	8.7...10.3

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)...β (*Pub. L. O.* **II**)...Δ (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

3 51 **618.** **H 2023.** The only measures are:

1902.77	32°6	3″95	2*n*	β^6	8.9...9.1

3 52 **619.** **β 1162.** A difficult pair; discovered with the 36-inch. It is about 25′ *nf β Andromedae.* The later measures do not show any motion.

1899.56	139°2	0″33	3*n*	A
1899.83	141.6	0.35	2*n*	Bar

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...Doolittle (*A. J.* 547)...A (3638)... Barnard ( )...]

(See p. 1057)

3 56 **620.** **Σ 94.** A little change in angle and distance.

1866.10	94°3	19″20	3*n*	Δ
1893.02	94.8	19.46	2*n*	Gla
1904.69	96.6	19.75	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se^1...Δ (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

(See p. 1057)

4 ± **621.** **(H².)** "Nova," from H², No. 746. This place agrees substantially with L 2048 (8 m), but I have not been able to find any such pair in or near this place. There is probably some error in H. I have not as yet been able to identify the pair.

4 24 **623.** **Σ 95.** (= **H 324.**) Δ could not see it in 1864–65, and I failed to find it with the 6-inch in 1873, but in December, 1874, it was a very easy object with that aperture. As the stars are both small, it is more likely that they were overlooked than that the companion was invisible in that instrument. Subsequently it was measured with the 18½-inch and found apparently unchanged:

1879.79	309°7	13″75	2*n*	β	8.7...9.1
1903.58	309.9	13.90	2*n*	β	

[Ma (*F. S.* **I**)...Ma (**XI**)...β^1...β^3...Δ (**II**)...Δ (1736)...β^6...]

624. 45 *Andromedae.* **Ho 215.** Single with 36-inch, 1890. No other measures. $4^m\ 26^s$

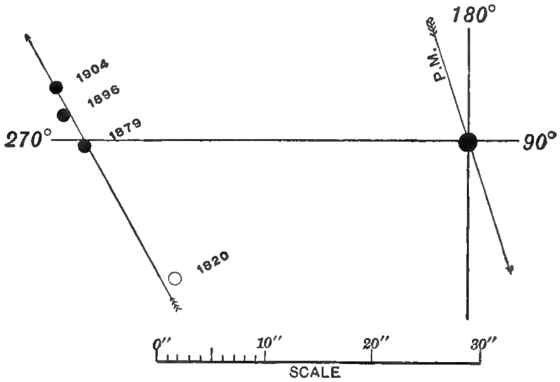
[Ho (2977, 3558)...β (3048)...β (*Pub. L. O.* **II**)...] (See p. 1057)

625. **Kr 10.** Noted as double by Krueger in *A. G. Hels.* 4 31

AB	1898.43	277°4	3″28	3*n*	Doo	9.7...10.8
AC	1898.43	91.9	23.40	3*n*	Doo	...11.4

[β (3042)...β (*Bul. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

626. **H 634.** The various magnitudes assigned to A would seem to suggest variability. It is B. A. C. 346 (7½ m); according to Heis it is a naked-eye star, 6–7 m; in L noted 6 m in one observation, and in another 8 m; in Arg. 7.2, and in Piazzi 8 m. It is wanting in W¹. In January, 1875, it appeared but little, if any, brighter than 8 m. In making the measures given below, I noted A 6.5 m, 1878.9; 8.0 m, 1879.9; and 7.0 m, 1880.9 These various estimates may after all be only errors of judgment, but the star should be carefully examined. The principal star has a proper motion of 0″258 in the direction of 17°7 (Porter) My measures of 1879 and 1904 give 0″228 in 24°3. 4 36



H 634

1820+	295° ±	30″ ±	1*n*	H	
1879.88	270.7	35.62	3*n*	β	...11.0
1896.13	266.5	37.41	3*n*	A	...11.0
1904.68	262.9	38.24	3*n*	β	

[β^3...A (3695)...β^6...]

629. **Σ 96.** Unchanged. 4 51

1869.56	284°1	1″07	4*n*	Δ
1879.78	279.5	1.41	1*n*	Cin

[Ma (*F. S.* **I**)...H (**IV**)...Ma (**XI**)...Se...Cin^6...Δ (**II**)...]

630. **β 398.** Discovered with the 6-inch. The later measures show no change. 4 52

1883.70	56°6	1″90	6*n*	En
1891.51	50.3	1.84	2*n*	β
1893.06	52.5	1.73	1*n*	Jones

[β (**VII**)...β (2103, 3114)...β (*Pub. L. O.* **II**)...Δ (**I**)...Engelmann (2678)... Jones (*A. J.* 312)...]

(See p. 1057)

5m 6s **633.** **β 236.** Discovered with the 6-inch. Apparently fixed.

1882.10	114°0	5″91	1*n*	Pt
1885.12	114.8	5.65	7*n*	En
1893.01	113.7	5.36	3*n*	W

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (I)...En (2742)...Pt...Wilson ( )...]
(See p. 1058)

5 6 **634.** **H 2024.** I have looked very carefully for this pair, and am certain that it does not exist in this place. There is probably an error of 1° in the Decl. of H, making it identical with β 236 (No. 633). A similar error in Decl. is found in H 2015.

5 10 **635.** **Σ 97.** Apparently fixed. *A. G. Harvard* gives proper motion of A, 0″028 in 180°

1868.40	99°3	4″54	4*n*	Δ
1899.96	97.3	5.05	2*n*	Es

[Ma (*F. S.* **I**)...Ma (**XIII**)...Wr...Δ (**II**)...Bryant (*Mon. Not.* **LX**, 494)...
Espin (*Mon. Not.* **LXII**, 528)...]

5 22 **636.** **H 2025.** The only other measures are:

1875.02	59°2	11″31	2*n*	Δ	9.5... 9.5
1900.39	59.7	11.10	2*n*	Es	9.2... 9.4

[Δ (I)...Espin (3717)...]

5 33 **637.** **β 258.** Discovered with the 6-inch. Change is uncertain. Aitken speaks of a 12m star, 204°: 41″.

1881.63	264°4	0″89	3*n*	β
1885.69	262.1	0.89	2*n*	HΣ
1888.97	262.3	0.78	3*n*	Sp
1889.57	268.2	0.99	3*n*	β
1897.84	256.7	1.01	3*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β4...β (2957)...β (*Pub. L. O.* **II**)...Δ (2086)...Δ (I)...HΣ (**XII**)...Sp (**III**)...A (*A. J.* 429)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5 42 **638.** **H 2026.** This star has considerable proper motion:

Boss	0″28 in 230°8
Porter	0.214 in 215.1

And this seems to belong to both stars. The only measures are:

1900.74	306°1	10″26	3*n*	β5	8.6...11.0

(See p. 1058)

6 8 **640.** **Skinner 1.** Noted as double by Skinner with the meridian circle of the Naval Observatory. Measures by Boeger (*A. J.* 522).

6 14 **641.** **Σ 98.** (=**H IV. 120=S 395.**) Fixed.

1865.15	248°9	19″63	3*n*	Δ
1892.91	248.3	19.61	2*n*	Gla

[Ma (*F. S.* **I**)...H (**VII**)...Ra (**XXIII**)...Δ (1204)...Δ (**I, II**)...Du...Per...
Per (2684)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

643. 35 *Ceti.* **OΣ 27** *rej.* Distance and magnitudes from *Poulkowa Catalogue* of 1843; excluded in 1850 as single. Δ in 1864 could not see any companion. Se has two observations of it, unless there is some mistake as to the identity—133°1 : 1″26 : 6...10 (1858.0); and 129°4 (1858.03). Ma (XI) gives the angle 60°0 (1844.0), but noted as "very uncertain." Carefully examined with 18½-inch in 1878 and 1880, and with the 36-inch under favorable conditions on two nights in 1891, and at all times it was absolutely single. Hussey with the 36-inch in 1899 could not see any elongation. There is no probability of this star being really double. 6m 21s

It has some proper motion:

Boss	0″222 in 237°9
Bossert	0.234 in 236.3
Porter	0.214 in 242.8

[Se...Ma (**XI**)...Δ (I. p. 227)...β3...β (3114)...β (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...]

644. **OΣ 26.** (=**H 1073.**) There is no evidence of any change. Ma mentions a third star, 105°2 : 54″, the magnitude of which is not given. 6 23

1866.54	258°5	10″61	3*n*	Δ
1898.68	258.0	10.95	3*n*	Hu

[OΣ (**IX**)...H (**IV**)...Ma (**XI**)...Ba (**I**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

645. **H 1074.** In another observation H gives 341°3: 12″±: 10–11...11. The only later observations are: 7 0

1897.53	340°9	8″65	4*n*	Doo	
1902.78	340.3	8.80	2*n*	β	10.0...11.2

[Doolittle (*Pub. Flower Obsy.* **I**)...β6...]

646. **β 1100.** Discovered with the 36-inch. Change doubtful. 7 9

1897.94	33°7	0″75	3*n*	A
1898.73	35.7	0.49	1*n*	β
1900.86	41.2	0.49	2*n*	Doo

[β (**XVI**)...β (2956)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (*A. J.* 429)...
Doolittle (*A. J.* 547)...]
(See p. 1058)

647. φ *Piscium.* **Σ 99.** The measures are not altogether accordant; but there is probably no material change. The large star has a proper motion of 0″018 in 180° (*A. G. Berlin*). 7 14

1865.82	226°9	7″74	3*n*	Δ
1886.94	226.3	8.04	3*n*	Hl
1904.02	227.5	7.72	2*n*	β

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...Se...Wr...Gl...WS...Pk...En (2663)
...Δ (**II**)...Hl (**II**)...Lewis (*Mon. Not.* **LVI**, 359)...HΣ (**XII**)...*Annals Toulouse Obsy.* **III**...β6...]

648. ζ *Piscium.* **β 1029.** (AB=**H IV. 8=Sh 16=Σ 100.**) The close pair was discovered with the 36-inch. Auwers gives the proper motion of A as 0″123 in the direction of 114°6, and this is obviously the movement of B, as these stars have remained relatively fixed since the first measures were made. 7 27

The measures of C cover a sufficient time to show that the small star belongs to the system. The position of this star for 1898.7 with reference to B, if fixed, should be 268°.3 : 1″.99 from the proper motion of the large star. It is evident from the measures that no such change has taken place, and that there is probably slow orbital motion. These three stars undoubtedly constitute a vast physical system. It would appear from the measures of the last seventy years that the proper motion of B is identical with that assigned to A from the meridian observations. From the position of B given by Σ in 1832, assuming that star to be fixed in space, its relation to A in its position in 1898.8 would be 44°.7 : 19″.40.

These are all the other measures of the close pair:

B and C

1888.99	248°.0	0″.7 ±	3*n*	Sp
1890.92	248.8	0.85	3*n*	β
1895.90	240.1	....	1*n*	Dyson
1896.74	241.5	0.97	3*n*	A
1898.73	241.7	0.88	1*n*	β

[β (**XIV**)... β (2875, 3048) ... β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Sp (**III**)... Dyson (*Mon. Not.* **LVI**, 359)...A (3395)...]

The measures of the wide pair are very numerous, and cover, first and last, more than a century. The early distances, however, are inaccurate and inconsistent, and the reliable results commence with the measures of Σ. A few only of the measures are given, but sufficient to show the relative fixity of these stars. All the measures will be found in the references below.

A and B (= Σ 100)

1832.83	63°.7	23″.46	5*n*	Σ
1866.04	63.8	23.77	3*n*	Δ
1888.71	63.5	23.72	5*n*	β
1890.92	63.5	23.70	2*n*	β
1898.76	63.5	23.67	4*n*	β

[Ma (324)... Ma (*F. S.* **I**)(**IX, X, XIII, XV**)... H (**VII**)...Da 1...Da 2... Bp... K...K (409)... Peters (1042)...Auwers (1393)... Bes ... Fl...Wh... Se...Lu (**I, II, III**) ... En ... Gl ... WS ... Sk 2 ... Hd...Du...Per...Engelhardt (*Ast. Obsns.* **II**)...Giacomelli (I)...Je (2324)... Sp (**II**)...Δ (1118)...Δ (I, **II**)... Franz (2590)...Glasenapp (**II, III**)...Cohn (3240)...Hagen (3258)...Chofardet (3450) ... Coleman (*Mem. R. A. S.* **LIII**) ... Solá (3563)... *Annals Toulouse Obsy.* **III**...Do (3680)...]

$7^m\ 36^s$ **649.** **H 2028.** (= **OΣ (App) 13.**) The companion is Rad. 374, $5^s.7$ *p* and 55″.5 *s*; magnitudes 7.1...8.1.

1875.84	204°.2	61″.01	4*n*	Δ	6.5...7.2
1882.25	204.0	61.18	4*n*	Fr	7.0...7.8

[Δ (I)...Franz (2649)...] (See p. 1058)

7 43 **650.** **H 636.** The only later observations are:

1902.62	288°.0	20″.37	2*n*	β^6	7.5...10.0

7 53 **652.** **OΣ 28.** (AC = **OΣ (App) 14.**) OΣ in catalogue of 1850 speaks of a faint star at 10″ from the close pair. There may be some change in AB.

1867.40	314°.7	0″.92	3*n*	Δ
1878.66	314.0	0.85	1*n*	β
1897.84	311.9	0.77	5*n*	Hu

The only other measures of C are:

1882.48	205°.8	130″.78	4*n*	Franz

The *Hamburg Observations* give the proper motion of A, 0″.047 in 82°.8.

[Ma (**XI**)...Δ (**I**, pp. 133, 238)...β 1...Franz (2649)...OΣ (**IX**)...Hu (*A. J.* 397) (*Pub. L. O.* **V**)...Big...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

653. **Σ 101.** (= **H IV. 77 = S 396.**) Probably without change. $7^m\ 54^s$

1868.20	340°.2	20″.50	4*n*	Δ
1892.89	340.5	20.94	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XIII**)...WJ...Gl...WS...WS 2...Sk 2...Flm...Cin 6... Δ (**II**)...Wilson (Cin 10)...OΣ (**X**, p. 151)...Glasenapp (**II**)...]

655. 37 *Ceti.* **Σ 3 App. I.** (= **H V. 24 = Sh 17.**) These two stars have the same proper motion of 0″.287 in the direction of 19°.7 (Porter). Relatively fixed. 8 21

1868.88	331°.4	49″.52	5*n*	Δ
1878.52	331.6	50.22	3*n*	Je
1881.83	331.0	49.90	3*n*	β
1892.89	331.1	49.58	2*n*	Gla
1904.19	331.3	49.40	4*n*	β

[H (**V**)...H 3...En...En (1518, 1674)...Ra (**XXI, XXV, XXXIII, XXXV**)...Je (2329)...β 3 (p. 325)...Δ (**II**)...Engelhardt (*Obsns. Ast.* **II**)...Glasenapp (**II**)...β 6... **OΣ (X)...**]

657. **Ho 6.** Discovered by Hough with the 18½-inch. 8 37

1893.84	114°.6	1″.26	1*n*	Ho

[Ho (2778, 3234)...] (See p. 1058)

658. **H 2030.** In Cin 6 there is a triple given in this place, "near a double having a position angle = 190°," with angles, AB 271°.8, and AC 114°.5 (1879.78) 1 *n*; distances not measured or estimated, and no magnitudes given. The only measures of H 2030 are by Espin (3717): 8 49

AB	1900.29	49°.1	23″.37	2*n*	Es	8.8...13
AC	1900.29	194.2	38.43	3*n*	Es	... 9.1

660. **Howe 2.** Discovered at Cincinnati by Howe. 9 34

[Cin 4...Wilson (Cin 10)...]

661. **H 2031.** "A third star 40″, 9 m." This is the place of the 7.5 m star, DM (43°) 258. 9 34

662. **β 3.** Discovered with the 6-inch. The only later measures are: 9 39

1888.68	29°.4	4″.18	2*n*	T
1893.01	28.5	4.58	3*n*	W

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...Δ (I)...Tarrant (2991)...Wilson ( )...] (See p. 1058)

9^{m} 50^{s} **663.** **H 1076.** The only measures are:

AB	1877.86	163°0	14″15	1*n*	β^1	
	1902.76	161.3	14.27	2*n*	β^6	8.5...12.7
AC	1877.86	258.2	41.	1*n*	β^1	
	1902.76	259.7	39.09	2*n*	β^6	...11.0

10 8 **665.** **Σ 104.** Apparently fixed.

1865.70	322°8	13″67	3*n*	Δ
1879.75	323.2	13.61	2*n*	β
1904.60	323.3	13.62	2*n*	β

[Ma (*F. S.* I)...H (IV)...Δ (II)...β^3...β^6...]

10 14 **667.** **Σ 106.** There has been no sensible change.

1868.50	308°4	4″78	4*n*	Δ
1880.22	309.8	4.90	3*n*	β
1896.61	307.3	4.77	3*n*	Soulé
1904.04	308.5	4.66	2*n*	β

[Ma (*F. S.* I)...Se...Cin^4...Cin^6...Δ (II)...β^3...Soulé (*A. J.* 410)...β^6...]

10 33 **669.** **Σ 103.** Identified as given here. Probably fixed.

1879.74	243°6	5″47	1*n*	Cin
1901.75	246.6	5.41	2*n*	β

[Ma (*F. S.* I)(XI, XIII)...Hd...Cin^6...β^5...]

10 39 **671.** **H 2033.** The only measures are:

1904.60	53°2	10″27	2*n*	β^6	9.9...11.2

10 40 **672.** **Σ 102.** But little change in the close pair, and C appears to be fixed.

A and B

1853.14	310°9	0″65	4*n*	OΣ
1867.07	306.4	obl.	5*n*	Δ
1886.95	305.0	0.50	3*n*	Hl
1904.61	303.7	0.48	1*n*	β

AB and C

1864.89	224°2	10″09	4*n*	Δ
1879.61	224.7	10.08	2*n*	Cin
1886.95	224.4	10.16	3*n*	Hl
1904.60	224.0	10.08	2*n*	β

There is a decided change in the angle and distance of D, and it follows that AB and C are moving together, and so form a triple system, or the faint star has a small proper motion.

AB and D

1832.45	66°9	29″89	3*n*	Σ
1861.89	64.6	28.62	2*n*	OΣ
1864.89	65.1	28.58	4*n*	Δ
1879.61	63.0	28.07	1*n*	Cin
1904.60	63.4	27.11	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H (V)...Flm...Δ (1572)...Δ (II)...Hl (II)...OΣ (IX)...Cin^6...Sk^3...β^6...]

10 53 **675.** **Σ 105.** Probably without change. H (IV) observed another pair in the field which he gives as 17^{s}5 *f*, and 2′ 40″*n*; 11°1:4″±:11...11–12. This is an error; it is *sp* Σ 205, and about 3′ distant in the direction of 209°.

1866.96	183°5	2″92	3*n*	Δ
1904.69	184.1	2.95	2*n*	β

[Ma (F. *S.* I)...Ma (X, XII, XV)...Cin^6...Δ (II)...β^6...]

676. **β 503.** Discovered with the 18½-inch. Apparently fixed. 10^{m} 54^{s}

1885.93	136°8	5″83	1*n*	HΣ
1898.65	134.6	5.77	2*n*	β
1900.78	132.2	5.81	3*n*	Doo

[β (X)....β^1....HΣ (XII).... Doolittle (*Pub. Flower Obsy.* I)(*A. J.* 547)....β (*Pub. Y. O.* I)...]

677. **Hd 45.** The only later observation is: 10 59

1904.04	99°9	36″71	2*n*	β^6	7.8...10.5

678. **Σ 107.** No change. The principal star has a proper motion of 0″075 in 228°4 (*A. G. Berlin*). 11 0

1866.42	67°9	20″94	3*n*	Δ	8.2...9.8
1904.69	67.7	20.89	2*n*	β	

[Ma (*F. S.* I)...Ma (XI)...H (V)...Δ (II)...β^6...]

679. **β 504.** Discovered with the 18½-inch. 11 9

1897.93	279°3	1″87	3*n*	Brown
1899.80	281.5	1.79	4*n*	Doo

Hd 46 has this place with estimated distance of 25″ for a 10.5 m companion, *s* of the principal star. Doubtless this refers to the following, not previously measured:

1904.70	175°9	49″54	1*n*	β^6	...10.8

[β (X)...β^1...β^3...Brown (3645)...Doolittle (*Pub. Flower Obsy.* I)...]

681. **Howe 3.** Discovered at Cincinnati. 11 18

1891.77	287°2	7″94	2*n*	Collins

[Cin^4...Wilson (Cin^{10})...Collins (*Proc. Haverford Coll. Obsy.* 1891)...]

682. **Σ 110.** Fixed. 11 46

1868.00	356°1	7″12	4*n*	Δ
1892.85	355.3	7.29	2*n*	Gla

[Ma (*F. S.* I)... Ma (XI)... Se... Cin^4...Δ (II)...Wilson (Cin^{10})...Glasenapp (II)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* III...]

683. **Σ 111.** No change. 11 55

1867.72	329°4	20″41	3*n*	Δ
1879.82	329.6	20.58	2*n*	β
1903.75	329.3	20.58	2*n*	β

[H (VII)...Ma (*F. S.* I)...Δ (II)...β^3...β^6...]

$11^{m}\ 56^{s}$ **684.** **Kr 11.** Noted as double by Krueger in *A. G. Hels.*

1898.43	241°.2	2″.06	4*n*	Doo

[β (3042)...β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11 59 **685.** *Andromedae* 194. **Σ 108.** Without change.

1870.12	62°.4	5″.97	6*n*	Δ
1904.69	61.5	5.99	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XII, XIII, XV**)...WS...Gl...Du...Sk^{2}...Δ (**II**)...Se...β^{6}...]

12 : **686.** **Hd 47.** No description in Hd. Jones (*Proc. Haverford Coll. Obsy.* 1892) measures a pair, the rough place of which is about the same as Hd 47.

1892.91	241°.8	9″.18	2*n*	Jones	8.3... 9.4

12 1 **687.** **OΣ 29** *rej.* Rejected in catalogue of 1850. Fixed. The only other measures are:

1845.74	264°.7	20″.05	1*n*	Ma
1899.05	266.5	20.51	3*n*	Hu

[Ma (**XIII**)...Δ (**II**)...Hu (*Pub. L. O.* **V**)...]

12 6 **688.** **Σ 109.** No material change.

1866.99	9°.5	7″.06	3*n*	Δ
1904.72	10.4	6.94	2*n*	β

[Ma (*F. S.* **I**)...Du...H (**V**)...Δ (**II**)...β^{6}...]

12 29 **690.** **H 5453.** The principal star has a large proper motion:

Porter	0″.499 in 121°.4
A. G. Nico.	0.447 in 115.1

The measures are too recent to decide whether or not the small star has the same movement.

1891.81	209°.5	27″.95	2*n*	Eng	8.3...10.0
1897.72	209.0	27.67	3*n*	Doo	
1901.75	208.4	27.45	2*n*	β	8.3... 9.9

[Engelhardt (**III**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^{5}...]

12 32 **691.** φ *Cassiopeiae.* **H III. 23.** "Triple Cl. III and IV." The only measures of this are given below. The proper motion of the large star is very small, 0″.010 in 204°.1 (*A. G. Hels.*). There are many small stars in the field. The *A. G.* positions give for the distant star, 230°.0 : 132″.68 (1873.8).

AB	1903.76	208°.7	48″.61	2*n*	β^{6}	...12.3
AC	1903.76	230.6	133.83	2*n*	β^{6}	... 7.5

12 40 **692.** **Barnard 2.** The only other measure is:

1900.74	12°.0	1″.45	1*n*	β

[Barnard (*A. J.* 447)...β^{5}...]

694. **Hd. 48.** Given as new by Wilson. $12^{m}\ 53^{s}$

1885.74	61°.3	9″.40	2*n*	Wilson	8.0... 9.7

[Hd...Wilson (Cin^{10})...]

696. **See 11.** Discovered at the Lowell Observatory. 12 59

1898.78	314°.1	2″.09	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...Scott (*Mon. Not.* **LXIV**, 52)...]

(See p. 1058)

697. 35 *Cassiopeiae.* **S 397.** (= **H. V. 81** = **OΣ (App) 15.**) 13 4
There is but little if any change. The proper motion of the larger star is 0″.068 in 135°.6 (*A. G. Hels.*). The companion is DM (63°) 175.

1875.82	349°.8	52″.46	4*n*	Δ	6.2... 8.0
1883.53	349.1	52.44	6*n*	Fr	6.9... 8.3
1903.76	348.0	52.90	2*n*	β	6.6... 8.5

[Ra (**XXII**)...Δ (**I**)...Franz (2649)...Espin (*Mon. Not.* **LXIV**, 678)...β^{6}...]

698. **Da 8.** Discovered by Dawes in 1858. Unchanged. 13 7

1871.78	143°.5	2″.86	2*n*	OΣ	8.0... 9.8
1897.44	138.7	2.92	5*n*	Doo	

[Da (*Mon. Not.* **XXIV**, 117)...Hd...Δ (**I**)...OΣ (**X**, p. 124)...Doolittle (*Pub. Flower Obsy.* **I**)...Espin (*Mon. Not.* **LXII**, 531)...]

699. **Weisse 3.** Marked "duplex 3″" in W^{2}. It is also noted as double in *A. G. Lund.* The only measures are those given from β^{6}. 13 17

700. **β 782.** Discovered with the 15½-inch at the Washburn Observatory. Apparently without change. 13 20

1885.70	77°.5	2″.96	2*n*	HΣ	
1886.86	76.2	2.82	2*n*	UL	
1888.41	76.7	3.16	3*n*	Com	8.0... 9.4
1893.20	80.9	2.96	4*n*	W	8.1... 9.6

[β (**XII**)...β^{4}...Updegraff, Lamb, and Comstock (*Pub. Washburn Obsy.* **V, VI**)...Wilson (   )...HΣ (**XII**)...]

(See p. 1058)

706. **Σ 112.** Change probable. I have added a faint attendant to B, not heretofore seen. A and B are respectively DM (45°) 320 and 319. 13 40

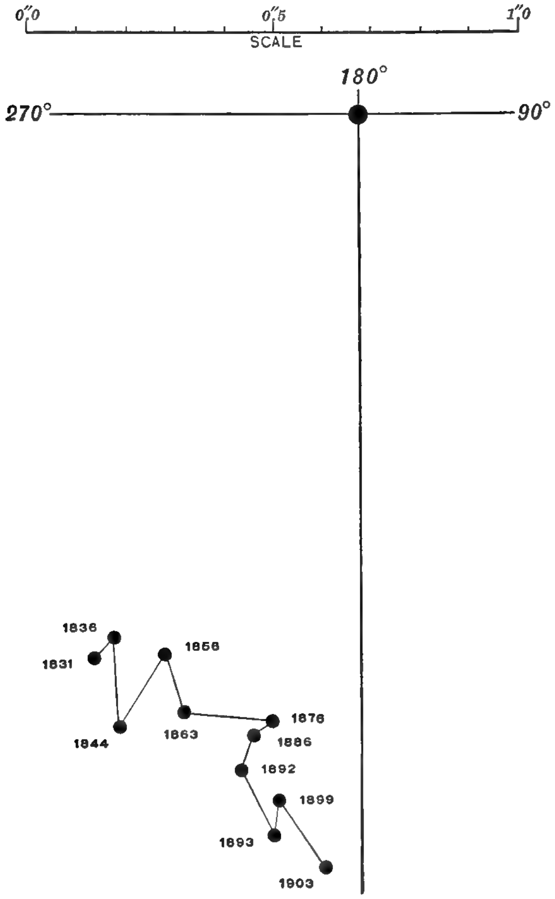
AB	1865.71	328°.7	22″.92	3*n*	Δ	
	1903.82	330.5	21.85	3*n*	β	
BC	1903.82	187.3	4.59	3*n*	β	...14.2

[Ma (*F. S.* **I**)...H (**V**)...Ma (**XIII**)...Cin^{6}...Δ (**II**)...β^{6}...]

707. 42 *Ceti.* **Σ 113.** Possibly a physical pair, but the change in the companion may be accounted for by the proper motion of A, which is given, 0″.015 in 277°.6 (*A. G. Nico.*). 13 41

The following measures, covering the range of motion, are shown on the diagram:

42 Ceti. Σ113



1831.61	333°.6	1″.24	4*n*	Σ
1836.91	334.3	1.18	3*n*	Σ
1844.72	338.1	1.35	2*n*	OΣ
1856.48	339.7	1.17	4*n*	Se
1863.03	343.1	1.27	6*n*	Δ
1876.08	351.4	1.25	2*n*	Hl
1886.98	349.9	1.28	3*n*	Hl
1892.84	349.4	1.36	2*n*	Jones
1893.04	352.9	1.48	3*n*	Maw
1899.10	353.6	1.41	6*n*	Doo
1903.87	357.5	1.54	3*n*	Furner

[Ma (*F. S.* **I**) . . . Ma (**X, XIII, XV**) . . . Bp . . . H^{2} . . . En (1673) . . . Ra (**XXI**) . . . J^{2} . . . J^{3} . . . Da^{3} . . . Hd . . . Gl . . . OΣ (**IX**) . . . Ferr . . . Se . . . Se^{2} . . . Se^{3} . . . WS . . . WS^{2} . . . Pl . . . Ba (**IV**) . . . Sk . . . Flm . . . Sp (2132) . . . Sp (**II**) . . . Cin^{4} . . . Cin^{6} . . . LM . . . Wilson (Cin^{10}) . . . Lv^{1} . . . Δ (1100, 1473) . . . Δ (**I, II**) . . . Do (2196, 2307, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Hl (**I, II**) . . . Perry (*Eng. Mech.* **XXXIX**, 11) . . . . Giacomelli (**I**) . . . . Je (2449) . . . . β^{2} . . . . β^{3} (p. 325) . . . . T (2898) . . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Glasenapp (**II**) . . . Maw (**II, III**) . . . Collins (*A. J.* 378) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Scott (*Mon. Not.* **LIX**, 427) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . HΣ (**XII**) . . . Sk^{5} . . . Solá (3497, 3563, 3679) . . . Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXII**, 383; **LXIII**, 403; **LXIV**, 790) . . .]

13^{m} 45^{s} **708. See 12.** See says "clearly and distinctly elongated" in 1897, but Cogshall examined it in 1899 with a variety of powers under favorable conditions, and could see no trace of elongation.

[See (*A. J.* 431) . . . Cogshall (*A. J.* 505) . . .]

709. β 1229. Discovered with the 12-inch. So far there has been no change. 13^{m} 46^{s}

1893.91	292°.9	1″.02	2*n*	Sellors
1896.82	291.3	0.96	2*n*	See
1896.84	291.6	1.12	1*n*	Cg
1897.96	292.6	1.14	3*n*	A
1900.81	291.7	1.20	2*n*	Doo

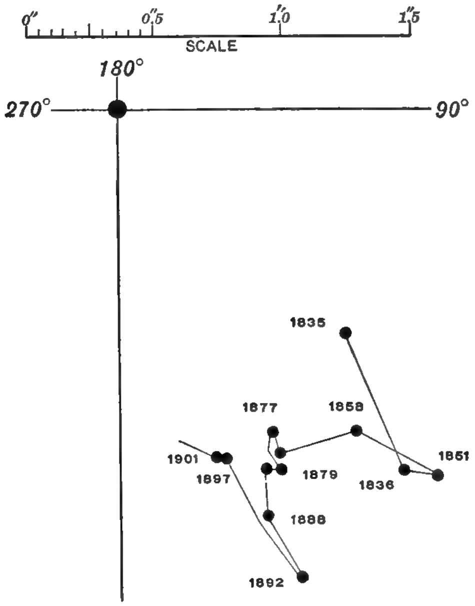
[β (**XVIII**) . . . β (3113) . . . β (*Pub. L. O.* **II**) . . . Sellors (3240) . . . See and Cogshall (3495) . . . A (*A. J.* 429) . . . Doolittle (*A. J.* 547) . . .]

710. A. G. 16. Noted as double in *A. G. Leipzig* and measures from the same. 13 54

1902.86	190°.1	30″.73	3*n*	Miller

711. H 2036. (= **β 110.**) The degrees of declination in the original catalogue was printed −15° by H. The correct place was given in errata to *Cape Observations*, but the number was erroneously given there as H 2306; and when re-discovered by me in 1873 as β 110, the identity of the two pairs was not at that time noticed. H (VIII, p. 287) regarded it as a binary in rapid motion from his own measures made in the course of six years, deducing an annual motion of −2°.4. The later measures show a certain, but much slower, angular movement. The magnitudes have been variously rated by different observers. It will be seen from the accompanying diagram that the measures are very discordant in both angle and distance, and that nothing can be inferred as to the character of the motion. 14 4

H 2036



1835.72	45°0	1″25	1*n*	H	8½... 9
1836.96	38.0	1.82	1*n*	H	8½... 8½
1851.90	40.7	1.89	2*n*	WJ	
1858.97	36.1	1.57	1*n*	J	6-7... 6-7
1876.20	24.6	1.49	5*n*	Δ	7.1...7.3
1877.76	25.1	1.40	5*n*	Cin	
1879.79	23.8	1.55	2*n*	Hl	
1886.98	21.9	1.53	3*n*	Hl	
1888.75	19.7	1.70	3*n*	Lv	
1892.84	20.9	1.98	2*n*	Gla	
1897.94	17.0	1.44	2*n*	Hu	
1901.86	15.4	1.42	4*n*	Do	

[WJ...J³...H³...Δ (I)...Sp (**II**)...Sp (2133)...Cin⁴...Cin⁶...Wilson (Cin¹⁰)...Lv¹...LM...Hl (I, **II**)...T (2991)...Jones (*Proc. Haverford Coll. Obsy.* 1892)....Glasenapp (**II**)....Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Do (3378, 3798)...Hu (*A. J.* 427)...Doolittle (*Pub. Flower Obsy.* **I**)...Solá (3563, 3679)...]

$14^m\ 29^s$ **712.** A. G. 17. From *A. G. Leipzig*. The only other measures are:

1902.87	99°1	54″78	3*n*	Cogshall

14 46 **713.** **Polaris.** *α Canis Minoris.* **Σ 93.** (= **H IV. 1** = **Sh 15.**) A and B appear to be relatively fixed, and probably form only an optical pair. Da proposed the 9 m star as a standard test for an aperture of two inches, but it has been seen by him and others with contracted apertures down to 1.6 inch. A few years ago two new companions, about 4″ distant, were claimed to have been seen by a Belgian observer, with a comparatively small aperture, and this was subsequently confirmed by several others in England, but it is absolutely certain now that these were purely imaginary stars. There is nothing nearer than the Herschel star within the reach of a 36-inch aperture. The faint stars, C and D, were the nearest stars which I could see with the Chicago 18½-inch. The only other measures are:

1890.79	83°3	44″68	2*n*	β	...15.0
1890.79	170.0	82.83	2*n*	β	...14.0

The proper motion of Polaris is 0″044 in 117°0 (Auwers). Some of the later measures of AB are:

1865.84	211°7	18″23	8*n*	Δ
1867.66	213.4	18.49	5*n*	OΣ
1870.90	213.8	18.59	7*n*	Du
1894.05	214.0	18.24	1*n*	Coleman

Polaris is a spectroscopic binary (Campbell, *Astrophysical Jour.* X, 180).

[Ma (*F. S.* **I**)...H¹...Da¹...Ma (**IX, X**)...Se¹...OΣ (**IX**)...Du...Cooper (2155) Wn (**V**)...Pk...Flm...Je (2324)...Sadler (*Eng. Mech.* **XL**, 34)...Big...Maw (**I**)...Δ (1473)...Δ (**II**)...β¹...β (*Ast. Register*, April, 1878)...β (*Eng. Mech.* **XL**, 153)...β (2929, 3048)...β (*Pub. L. O.* **II**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals. Roy. Obsy. Edinburgh* **I**, 188...Doolittle (*A. J.* 564)...]

[PARALLAX.—Piazzi-Cacciatore (*Praecip. Stellarum. Pos. Med.*)....Brinkley *Recueil de Mem. des Astr. de Poulkowa* **I**, 38)...Von Lindenan (*B. J.* 1820)...W. Struve and Brioschi (*Recneil de Mem. des Astr. de Poulkowa* **I**, 65, 175)...C. A. F. Peters (same, p. 136)...Glasenapp (*Refraktsionnya Oklony*)...L. De Ball (*A. N.* 2667)...Pritchard (*Mon. Not.* **XLIX**, 2) (*Pub. Oxford University*, Part **III**)...]

(See p. 1058)

14 59 **714.** *Piscium* 235. **β 4.** Discovered with the 6-inch. Slow retrograde motion is probable, with no sensible change in distance. In 1875 Δ could only see a doubtful elongation in 68°. This star is Lalande 2435. The faint star first noted with the 36-inch. The close pair has a proper motion of 0″033 in 26°1 (Battermann).

A and B

1880.84	75°9	0″58	3*n*	β
1886.73	73.6	0.48	3*n*	LM
1888.84	59.0	0.43	3*n*	Lv
1889.93	69.1	0.4±	5*n*	Sp
1890.88	69.2	0.40	4*n*	β
1898.73	67.4	0.36	2*n*	β
1901.92	68.3	0.34	3*n*	Bryant
1904.62	65.0	0.36	1*n*	A

AB and C

1898.76	248°9	22″28	1*n*	β	...13.5

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β¹...β³...β (3048)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Cin⁶...OΣ (**X**)...LM...Lv¹...Lv (*Sid. Mess.* **VIII**, 77)...Doolittle (*Pub. Flower Obsy.* **I**)...Bryant and Bowyer (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIV**, 790)...]

716. **Σ 114.** Probably unchanged. $15^m\ 4^s$

1868.01	356°7	3″68	4*n*	Δ
1904.70	356.4	3.48	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**V**)...Se (*Comp. Rend.* **XLVIII**, 375)...Do (2989)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...Cin⁶...β⁶...]

718. **Σ 115.** There appears to be no change in the angle, 15 42 and probably none in the distance; but the stars have a common proper motion of 0″199 in the direction of 131°2 (*A. G. Hels.*). **Porter gives 0″172 in 138°6.**

1852.98	152°7	1″04	4*n*	OΣ
1867.81	149.8	1.06	4*n*	Δ
1892.84	147.6	1.44	2*n*	Gla
1900.78	147.7	1.05	3*n*	Do

[Ma (*F. S.* **I**)...H²...Ma (**IX**)...Wr...OΣ (**IX**)...Se...Bl (**V**)...Δ (1118)...Δ (**I, II**)...Glasenapp (**II**)...Do (3680)...Espin (*Mon. Not.* **LXII**, 528)...]

719. **Hu 6.** (AB = **H 2039.**) The *p* star of H 2039 was 15 56 found to be a close pair by Hussey. AB and C are respectively SD (10°) 294 and 295. The only measures since H of the wide pair are·

1902.25	60°4	45″80	2*n*	β

[Hu (*A. J.* 480)...β⁶...]

720. **Jones 1.** Place approximate. From *Proceedings* 16 : *Haverford College Observatory*, 1892.

721. **See 13.** Discovered at the Lowell Observatory. 16 2

1899.65	318°6	0″35	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

723. **Ku 8.** (= **Hu 524.**) The other measures are: 16 21

1902.60	331°4	2″34	3*n*	Hu	9.2... 9.4

[Kustner (3821)...Hu (*Bul. L. O.* No. 27)...]

16m 18s **724.** **OΣ (App) 16.** Without change.

1890.95	138°2	63″51	3*n*	Franz

[Δ (I)...Franz (3464)...]

16 21 **725.** Measured with the 40-inch (β^6) in looking for H 13 (No. 737).

16 28 **726.** **H 637.** "Very delicate." By an error in reducing my distance of 1877, it was printed 25″92. It should be as now given.

1877.84	168°3	31″50	1*n*	β	
1899.78	168.9	31.36	3*n*	Doo	7.5...12.2

[β1...Doolittle (*Pub. Flower Obsy.* **I**)...]

16 41 **727.** **H 2043.** (= **H 3362.**) There is an error of 1h R. A. in the place of H 3363 (See No. 171). The large star has a proper motion of 0″123 in 246°1 (Kustner), and the companion is moving with it.

1846.85	76°4	4″89	1*n*	J	
1877.84	72.9	5.30	2*n*	Cin	6.5... 8.5
1892.90	73.8	4.98	2*n*	Gla	6.4... 9.2

[Glasenapp (**II**)...J 2...Cin 4...Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LIX**, 427)...See (3495)...]

16 47 **728.** **Lv 1.** Discovered by Leavenworth (*Pub. McCormick Obsy.*, I, Part 4). (See p. 1058)

17 27 **732.** *ψ Cassiopeiae.* **β 1101.** (AC = **Ħ V. 83** = **Sh 18**; ACD = **Σ 117.**) The close companion to the principal star of this well-known triple was discovered with the 36-inch. Auwers gives the proper motion of the large star as 0″067 in the direction of 70°8, and this corresponds very nearly to the change in C, as shown by the measures. A and B are moving together, and make a physical system. These are all the later measures:

A and B

1891.52	44°9	2″93	4*n*	β
1898.68	41.8	2.93	3*n*	β
1903.12	44.4	2.85	3*n*	β

[β (**XVI**)...β (2956, 3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β4...β (*Ast. and A.-P.* **XIII**, 16)...β6...]

A, C, and D evidently form a perspective group, the small stars being fixed in space. The measures of Σ, Δ, and β, 1831–98, give 0″088 in 68′3 for the proper motion of A, which is substantially the same as that from meridian observations. There is no change in the double companion, CD.

A and C

1783.62	100°2	33″42	1*n*	Ħ
1831.04	101.8	32.22	5*n*	Σ
1866.38	105.1	29.56	4*n*	Δ
1881.66	106.8	28.67	4*n*	β
1889.52	107.4	28.01	4*n*	β
1898.68	108.8	27.44	3*n*	β
1900.80	108.0	27.37	3*n*	Do

C and D

1831.04	253°3	3″01	4*n*	Σ	8.9... 9.5
1867.28	254.8	2.79	4*n*	Δ	9.7...10.6
1881.66	256.0	3.08	4*n*	β	9.9...10.2
1889.52	254.7	2.86	4*n*	β	9.6... 9.8
1898.65	255.4	2.90	3*n*	β	

[Ma (*F. S.* **I**, pp. 43, 82)...Ma (**XI, XIII, XV**)...H (**IV**)...*Gr. Obsns.* 1840...Ra (**XXII**)...Bp...Da3...Se...Mh...Ferr...WS...Sk...Bl (**V**)...Δ (1572) (**II**)...Do (2196, 3680) (*Trans. R. I. Acad.* **XXIX**, Part 13)...T (2898)...Flm...Hl (**II**)...En (2663)...Coleman (*Mem. R. A. S.* **LIII**)...]

733. **Ho 309.** Discovered at the Dearborn Observatory (*A. N.* 3233). Since Part I of this catalogue was in type I have measured this pair, and find that the angle of AB as given by Hough is 180° in error. 17m 34s

AB	1904.71	25°6	2″52	2*n*	β^6
AC	1904.71	96.5	43.74	1*n*	β^6

(See p. 1058)

734. **OΣ (App) 117.** The change appears to be due to the proper motion of C, as AB remain fixed. The following are all the later measures: 17 37

AB	1888.16	102°9	37″17	3*n*	Franz
	1904.71	102.8	37.10	2*n*	β
AC	1888.16	337.0	146.13	3*n*	Franz
	1904.71	338.4	144.75	2*n*	β
CD	1888.16	292.9	51.88	3*n*	Franz
	1904.71	291.0	53.60	2*n*	β

These stars are respectively DM (38°) 255, 256, 254, and 253.

[Δ (I)...Franz (3080)...β6...]

735. **H 1078.** In H (VI) the angles and distances are respectively 93°5 : 12″ and 98°2 : 30″, from which he inferred a change, as the stars at first appeared in a staight line. I examined this in 1874, and the three stars appeared exactly in line. My recent measures show no change. 17 45

AB	1903.87	90°3	15″60	2*n*	β^6	8.7...12.0
AC	1903.87	90.4	28.12	2*n*	β^6	...11.7

737. **H 13.** "Neat double star; immediately preceded by a large nebula, II, 52." There are two distant companions to the 9.2 m star, DM (12°) 172, on the *p* side. No nearer companion seen. The nebula referred to is in the field *p*. My angle does not agree with H, which he gives as 40° *np*. Probably this should be 40° *sp*. 17 52

1902.74	215°6	27″82	1*n*	β^6	12.0...12.5

738. **Se 1.** Discovered by Se. Erroneously called H 3429 by Se, the place of which is given in *Cape Observations* as some distance *np*. H subsequently found an error of 1h in his place, and my observations show a further error of 1° in declination, making it the same as H 1957 (See No. 163). The 17 53 large star of this fine new pair is 6½ m in Lalande. It is noted as double in the Cordoba Zones. There is no change.

1888.96	81°.1	2″.98	2*n*	Lv
1895.86	76.7	2.38	3*n*	Scott
1897.70	82.5	2.84	2*n*	See

[Se1 ... Cin4 ... Cin6 ... Lv1 ... LM ... Scott (*Brit. Ast. Ass'n* **VI**, 368) ... See (3495) ... Do (3798) ...]

18m 0s **740.** 44 *Ceti.* **H 1079.** The change in distance is due to the proper motion of A, 0″.134 in 115°.4.

1877.86	299°.6	76″.40	1*n*	β^1
1900.73	298.7	80.37	2*n*	β^5

18 1 **741.** *θ Ceti.* **β 505.** A minute companion noted with

thought the principal star elongated. Doolittle found it single in 1897.

1867.13	279°.7	7″.14	3*n*	Δ
1897.77	280.4	7.76	4*n*	Doo

[Ma (*F. S.* **I**) .... Ma (**XI**) .... Cin4 .... Cin6 .... Δ (**II**) .... Doolittle (*Pub. Flower Obsy.* **I**) ...]

751. **H 638.** The only measures are my own. It is in the field *nf* SD (4°) 203. 19m 5s

1901.82	271°.5	9″.41	2*n*	β^5	11.2...11.5

753. **Σ 121.** Distance decreasing? 19 29

18

18

18

18

slow direct angular motion. The distant stars, CD, are apparently unchanged relatively.

A and B

1881.84	91°9	2″29	4*n*	β
1888.70	95.4	2.64	3*n*	β
1892.01	100.2	2.28	3*n*	β
1898.38	96.7	2.71	3*n*	β
1902.91	96.0	2.58	1*n*	β

A and C

1881.84	110°3	134″26	2*n*	β
1888.75	110.3	132.49	3*n*	β
1891.97	110.3	130.93	1*n*	β
1897.82	110.4	128.84	2*n*	β
1902.90	110.5	126.87	4*n*	β

C and D (=β 82)

1881.84	140°1	5″04	3*n*	β
1888.75	137.9	4.96	3*n*	β
1892.03	139.0	4.53	2*n*	β
1897.82	138.3	5.07	2*n*	β
1898.87	136.8	5.32	1*n*	L

[β (**II, XIII**)...β (*Mon. Not.* **XXXIII**, 437)...β3...β (2875, 3114)...β (*A. and A.-P.* **XIII**, 15)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β6...Lewis (*Mon. Not.* **LIX**, 400)...]

$20^{m}\ 38^{s}$ **759.** Σ 118. Both distance and angle increasing; rectilinear motion. The proper motion from the measures is 0″047 in the direction of 310°. The change will be apparent from the following:

1832.49	62°0	10″75	4*n*	Σ
1864.79	69.8	11.21	6*n*	Δ
1879.86	72.8	11.84	2*n*	Hl
1888.98	73.9	12.00	2*n*	Hl
1897.43	75.4	12.23	5*n*	Doo
1904.70	77.2	12.16	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)... H (**V**)... Δ (1473)... Δ (**II**)...Flm...Hl (**I, II**)...Do (2989)...Do (*Trans. R. I. Acad.* **XXIX**. Part 13)...Big...Cin6...β (*A. and A.-P.* **XIII**, 19)...Doolittle (*Pub. Flower Obsy.* **I**)...β6...]

20 41 **760.** Σ 122. There is no evidence of motion. The angle in Struve appears to be too large.

1865.71	327°5	6″00	3*n*	Δ
1881.84	328.2	6.23	3*n*	β
1886.98	328.4	6.07	3*n*	Hl
1902.81	328.4	6.06	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XV**)...H2...Se...Se2...WS...Gl...Sk2...Flm...Hl (*Wash. Obsns.* 1886)....Hl (**I, II**)....Pt....Cin6....β3 (p. 325)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Collins (*A. J.* 378)...*Mon. Not.* **LX**, 494...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Do (3930)...]

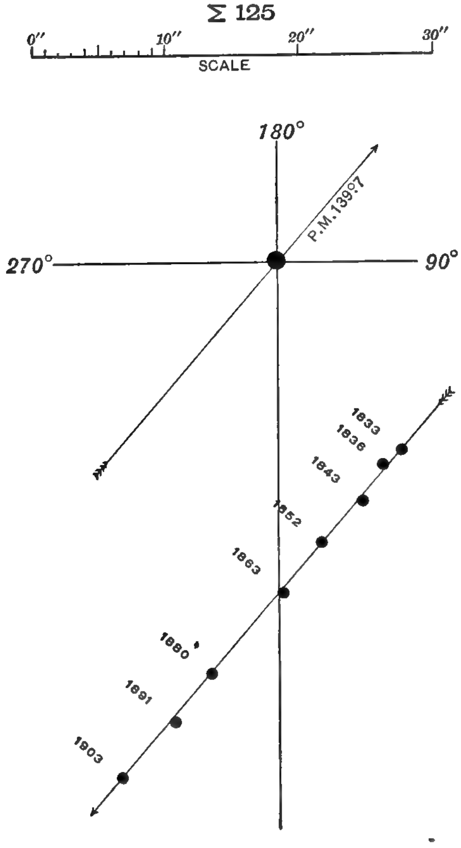
20 50 **761.** Σ 125. A perspective pair, the relative change being due to the proper motion of A, which is given:

Porter	0″449 in 143°0
Stumpe	0.516 in 138.8
A. G. Nico.	0.417 in 139.7
Σ and β measures	0.457 in 139.9

The following selected intervals are shown on the diagram:

1833.23	33°3	16″91	6*n*	Σ
1836.62	27.3	17.21	4*n*	Σ
1843.90	19.3	19.05	2*n*	OΣ
1852.91	8.6	21.35	2*n*	OΣ
1863.79	0.8	24.80	4*n*	Δ
1880.85	350.9	31.48	4*n*	β
1891.81	347.3	35.75	2*n*	Eng
1903.78	343.5	40.67	4*n*	β

Σ 125



[Ma (*F. S.* I)...Ma (**X, XI, XIII**)...Hd...WS...WS2...Gl...Δ (1473)...Δ (**II**) OΣ (**IX**)... Flm... Cin4...Cin6...Wilson (Cin10)... K (1519)...β3...Engelhardt (**III**)...Sk...Sk3...Sk4...Sk5...β6...]

762. Σ 123 *rej.* Measures and magnitudes from H (V). $20^{m}\ 53^{s}$ In *Cat. Nov.*, Cl. IV, 8–9...9, and Cl. III, 9...11. The only measures are by Espin (3717):

AB	1900.56	161°4	16″41	3*n*	8.9... 9.2
BC	1900.56	187.6	38.24	3*n*	...11.2
CD	1900.56	76.5	10.39	3*n*	...12.8

763. A. C. 14. Discovered by Alvan Clark, 1858. Probably without motion. 21 15

1876.27	95°4	0″78	6*n*	Δ	7.8... 8.7
1901.26	96.8	0.70	2*n*	A	

[Da4...Δ (I)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

21^m 26^s **765.** 95 *Piscium.* **β 1164.** Discovered with the 36-inch. In B.A.C., 7 m; in DM, 8.0; and *A. G. Albany*, 7.3. The principal star has some proper motion:

Boss	0″.162 in 193°.2
Porter	0.155 in 202.7

These stars certainly make a binary system, as they are evidently moving in space together. So far there is but little relative change. Assuming as correct the relation shown in the first set of measures, the distance should be 0″.94 and the angle 36° in 1898 if the proper motion belonged to only one star.

1892.97	167°.4	0″.33 ±	4*n*	Sp
1895.49	162.4	0.43	2*n*	Lewis
1896.53	171.0	0.32 ±	2*n*	Sp
1898.73	163.0	0.36	1*n*	β
1898.94	160.2	0.40	1*n*	A
1901.19	168.6	0.39	4*n*	Bryant

774. **Σ 126** *rej.* Measures and magnitudes from H (VI). In *Cat. Nov.* the magnitudes are 7–8...8–9...10. In 1876 the two larger stars appeared to be 8 and 9. 22^m 41^s

AB	1902.90	214°.5	43″.42	2*n*	β^6	8.6... 9.6
BC	1902.90	240.8	20.22	2*n*	β^6	...10.2

776. **A. G. 19.** From *A. G. Leipzig.* 23 30

1902.87	321°.8	102″.01	3*n*	Cogshall

777. **Σ 128** *rej.* The principal star is 7.7 m in DM. The only observations are: 23 45

1828+	303°.9	14″ ±	1*n*	H (IV)	9 ...11
1904.70	305.5	12.98	2*n*	β^6	8.2... 9.8

value, according to Auwers, is 0″0035 in the direction of 124°6. The time covered by the measures is too short to show whether or not this movement belongs to the small star. It will probably turn out to be a physical pair. It is also given as a spectroscopic binary (H. C. Lord, *Astrophysical Jour.* XIX, 249).

1880.12	14°2	1″16	3*n*	β
1888.73	16.5	1.10	3*n*	β
1890.78	14.8	0.99	3*n*	β
1900.95	15.4	1.20	2*n*	L

[β (**X**)...β1...β3...β (2875, 3048)...β (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LVI,** 359; **LIX,** 400; **LXI,** 486; **LXII,** 383)...]

25m 10s **791.** **H 2050.** "? minute of R. A." This is the 9.4 m star, DM (55°) 351, and the R. A. correct.

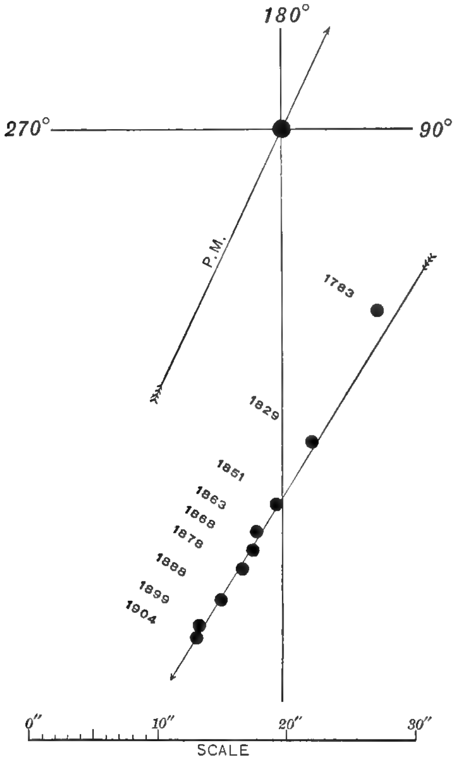
1904.70	82°1	15″26	1*n*	β6	9.8...10.2

25 17 **792.** **Σ 131.** The chief star of a fine cluster, H (IV). Without change.

1865.99	142°8	13″78	3*n*	⊿
1881.61	142.9	13.81	3*n*	β
1904.70	143.0	13.88	2*n*	β

[Ma (*F. S.* **I**)...H2...H (**IV**)...Ma (**XI**)...⊿ (**II**)...β4...β6...]

25 35 **794.** **Σ 132.** (= **H** IV. 130.) A perspective pair, the change being due to the proper motion of A. For an early examination of this motion see Ma (XV) and *Pos. Med.*, p. ccxxv.



Σ 132

The proper motion of A from meridian observations, and from measures of *C*, 1829 and 1904, is given:

Porter	0″238 in 154°6
Bossert	0.251 in 156.4
Σ—β	0.233 in 148.9

The 40-inch shows a 13 m star, from A, 154°0 : 15″5. The following selected epochs are shown on the diagram:

1783.68	27°7	15″81	1*n*	H
1829.87	5.4	24.25	2*n*	Σ
1851.82	359.0	28.88	1*n*	OΣ
1863.84	356.2	30.99	3*n*	⊿
1868.91	355.8	32.43	1*n*	OΣ
1878.01	354.6	33.86	1*n*	β
1888.14	352.4	36.65	2*n*	Eng
1899.79	350.2	38.71	2*n*	Doo
1904.68	350.3	39.60	3*n*	β

[Ma (*F. S.* **II**)...Ma (**XIII, XV**)...⊿ (1473)...⊿ (**II**)...Gl...WS...OΣ (**IX**)... OΣ (**X,** p. 151)...Flm...Sk2...Engelhardt (*Obsns. Ast.* Part 2)...Glasenapp (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...β6...]

795. **A. G. 20.** From *A. G. Leipzig*. Measured at the Kirkwood Observatory: 25m 43s

1902.86	245°1	2″71	3*n*	Miller	9.0...9.1

796. **H 2052.** This is also H 3373, there being an error of 1h R. A. in H's place of the latter. (See No. 268.) B is Lalande 2799. The only observation since H is: 25 47

1904.72	117°4	78″41	2*n*	β6

797. **Σ 130.** Fixed. 25 50

1866.33	186°7	7″44	3*n*	⊿
1904.70	187.6	7.56	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**IV, V**)...Wr...Du...Gl...⊿ (**II**)... β6...]

798. *Andromedae* **219.** **Σ 133.** The distance between the two pairs is decreasing, and some change is probable in AB. From the measures, AB would appear to have a proper motion of about 0″06 in the direction of 220°. There is no change in CD. 25 55

		A and B		
1863.59	185°4	2″87	5*n*	⊿
1878.84	184.5	2.97	3*n*	Hl
1903.83	183.0	2.96	3*n*	β
		A and D		
1863.76	197°9	27″29	4*n*	⊿
1878.84	197.4	26.71	3*n*	Hl
1903.82	196.2	25.04	2*n*	β
		A and C		
1863.76	193°8	32″31	4*n*	⊿
1887.02	192.6	30.73	3*n*	Hl
1903.86	190.8	29.98	1*n*	β
		C and D		
1878.84	168°9	5″06	3*n*	Hl
1895.90	167.8	5.67	2*n*	Collins
1903.82	169.2	4.95	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**VII**)...Gl...WS...Sk2...Sk3...Hl (**I, II**)...⊿ (1572)...⊿ (**II**)...β (*Ast. and A.-P.* **XIII,** 19)...Collins (*A. J.* 378)...HΣ (**XII**)...β6...]

26^m 38^s **799.** **H** 3442. Carefully looked for, and certainly no pair in this place. There is an error of 1^h in H's R. A. (See No. 282.)

26 42 **800.** **Arg.** 4. Marked "double Cl. II" in O. Arg. S. Measures from Cin[4]. (See p. 1058)

26 44 **801.** **H** 2047. H has two observations differing 5^m in R. A. An examination to identify the star showed that both positions were erroneous, the larger being 2^m too large.

1903.62	44°.7	11″.83	2*n*	β^6	9.5...9.5

26 48 **802.** **Arg.** 5. "Duplex Cl. III" in *O. Arg. N.* Measures

813. 100 *Piscium.* Σ 136. (= **H** IV. 131 = **Sh** 19.) Relatively fixed. The proper motion is 0″.046 in 273°.8 (Auwers). 28^m 29^s

1844.58	79°.1	16″.17	4*n*	OΣ
1865.45	79.0	15.85	3*n*	*Δ*
1894.92	78.2	15.75	3*n*	Coleman
1902.81	78.6	15.72	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...Fl...Bp...Ra (**XXII**)...K...Se...En...WS...Gl...OΣ (**IX**)...Du...Ba (**II, III, IV**)...*Durham Obsns.* 1846–48...Sk[2]...Per...Per (2684)...K (1519)...*Δ* (1118)...*Δ* (**I, II**)...T (2898)...Glasenapp (**II, III**)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...*A. G. Leipzig*, p. 206...*Annals Toulouse Obsy.* **III**...Do (3930)...]

816. Σ 137. Without change. 28 42

1869.78	87°.5	3″.28	5*n*	*Δ*
1904.70	86.6	3.20	2*n*	*β*

[Ma (*F. S.* I)...H (**VII**)...Se...*Δ* (**II**)...β^6...]

the micrometrical measures, assuming that the change is due to the movement of A, gives the proper motion of that star, 0″132 in the direction of 340°9. The smaller star may have some proper motion of its own. The measures of AB in the next few years will show whether or not the motion is rectilinear. The 40-inch shows a 14 m star, 329°5:28″0.

[β (**XIII**)...β^3...β (3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β^6...]

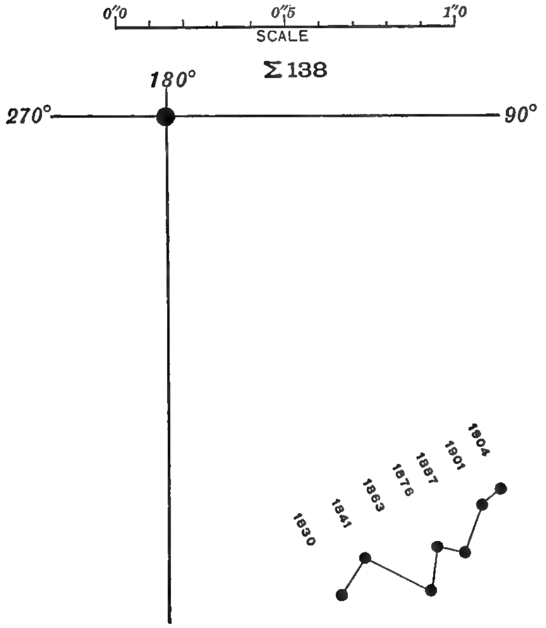
29^m 31^s **826.** **OΣ** 33. The smaller star is Rad^1. 477. No material change.

1866.58	75°0	24″65	3*n*	Δ	6.5...7.8
1883.43	75.7	24.98	5*n*	En	7.2...8.4
1898.71	75.6	25.37	3*n*	Hu	
1903.00	75.6	25.22	2*n*	Do	

[Ma (**XI, XIII**)...Ba (I)...Sk^3...Δ (1806)...Δ (I)...OΣ (**IX**)...En (2678)...Hu (*Pub. L. O.* **V**)...Do (3798, 3930)...]

29 46 **830.** **Σ** 138. (= Ħ N. 92.) The close pair is probably a binary, but the motion is very slow.

1830.23	20°0	1″47	3*n*	Σ
1841.54	24.2	1.40	9*n*	Da
1863.55	29.1	1.57	8*n*	Δ
1876.16	32.2	1.49	3*n*	Δ
1877.05	32.1	1.46	5*n*	Sp
1887.03	34.4	1.49	3*n*	Hl
1887.23	34.4	1.57	3*n*	HΣ
1901.54	39.1	1.45	13*n*	Gr. Obsy.
1904.39	41.9	1.45	3*n*	β



The faint star, C, was added by Hall with the Washington 26-inch. The only later measure is:

1903.82	65°1	23″54	1*n*	β	...15.5

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Ra (**XXII**)...Ba (**II, III**)...WJ^2...Se...Se^2...Wr...J^2...En (1673)...Hl (*Wash. Obsns.* 1876)...Hl (**I, II**)...Da^3...Fl...Bp...Hd...WS...WS^2...Gl...Do (2196, 2316, 2989, 3798)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Pl...Flm...Δ (1100, 1256, 1473, 2192)...Δ (**I, II**)...Sp (2132)...Sp (**II**)...Je (2449)...T (2866)...Sk^2...Lv^1...Perry (*Eng. Mech.* **XXXIX**, 11)...Maw (I)...OΣ (**IX**) (**X**, p. 151)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Collins (*A. J.* 378)...Solá (3563) (3679)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXIII**, 403; **LXIV**, 790)...]

30^m 2^s **831.** **H** 2061. The change is due to the proper motion of A, which is given:

Porter	0″360 in 123°6
Stumpe	0.360 in 124.5
Rad^3.	0.289 in 134.8

The only measures are the following:

1890.94	322°4	63″05	2*n*	β	7.5... 9.7
1896.13	321.0	65.59	3*n*	A	
1902.25	321.5	66.76	2*n*	β	

[β (3048)...β (*Pub. L. O.* **II**)...A (3395)...β^6...] (See p. 1059)

30 3 **832.** **β** 869. Discovered with the 18½-inch. Apparently fixed.

1892.00	197°9	5″31	3*n*	β
1898.78	196.6	5.25	3*n*	Bd

[β (**XIII**)...β^3...β (3114)...β (*Pub. L. O.* **II**)...Boothroyd (*A. J.* 478)...]

30 25 **833.** **H** 1085. In DM 8.3 m. The only measures since H are:

1879.77	296°0	3″92	2*n*	Cin^6
1883.38	118.8	4.07	5*n*	En (2678)

(See p. 1059)

30 34 **835.** **H** 2055. "Near 40 *Cassiopeiae*." The R. A. in H is about 1½^m too large, his place being that of 40 *Cassiopeiae*. The double is 1^m 37^s *f* and 7″ *s*. The 40-inch shows a nearer companion 13 m, 55°3 : 13″8.

1903.90	315°3	18″02	1*n*	β^6	9.7...11.3

30 35 **836.** **H** 3447. B. A. C. 489. Gould calls this τ *Sculptoris*. There appears to be some change in the angle and distance.

1837.22	75°4	3″35	2*n*	H
1846.35	82.8	2.85	2*n*	J
1877.80	90.1	2.20	3*n*	Cin
1881.84	87.3	2.19	4*n*	β
1888.99	89.2	2.32	2*n*	Lv
1894.83	93.3	1.82	6*n*	Scott
1896.82	92.6	2.01	3*n*	See
1902.90	97.0	1.80	3*n*	Scott

[H^3...J^1...J^2...WJ...WJ^2...Flm...Russell (*Sydney Obsns.* 1881)...Cin^4...Lv^1...Hl (**II**)...β^3 (p. 325)...Do (3378, 3798)...Scott (*Brit. Ast. Asso.* **VI**, 248) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)....See (3495)....Solá (3563, 3679)....Tebbutt (*Mon. Not.* **LXI**, 501)...Lunt (*Mon. Not.* **LXI**, 579)...]

30 55 **837.** **OΣ** 32. At first thought by OΣ to be a close pair. The R. A. in catalogue of 1850 is 1^m too large. Companion

not seen by Δ in 1865. Distance may be decreasing. The only later measures are:

1878.67	134°.0	8″.92	2*n*	β
1897.43	136.5	8.61	5*n*	Doo
1899.21	136.6	8.35	2*n*	Hu

[OΣ (IX)...Δ (I, p. 227)...β1...Doolittle (*Pub. Flower Obsy.* I)...Hu (*Pub. L. O.* V)...]

31m 3s **839.** **OΣ (App) 20.** Change in distance. The later measures are:

	1891.17	313°.6	95″.08	4*n*	Franz	
	1903.72	313.5	94.33	2*n*	β	
A*a*	1903.72	257.2	27.38	2*n*	β	...12.9

[Δ (I)...Franz (3464)...β6...]

854. 103 *Piscium.* β 5. Discovered with the 6-inch. No relative change is shown by the measures. The principal star has a proper motion of 0″.040 in the direction of 228°.3 (Auwers). If the small star was fixed, its position at the date of the last measures in 1898 would be 330°.4 : 1″.20. It is therefore certain that the two stars are moving together, and that they form a physical system. Some of the later measures are: 32m 47s

1880.78	297°.3	1″.31	3*n*	β
1888.30	294.7	1.28	4*n*	T
1889.95	292.0	1.07	3*n*	Sp
1898.00	290.7	1.38	3*n*	Brown

[β (I)...β3...Δ (I)...Lv1...J. J. M. Perry (*Eng. Mech.* XXXIX, 11)...T (2899, 2991)...OΣ (X)...Sp (III)...Brown (3645)...Doolittle (*Pub. Flower Obsy.* I)...]

856. Σ 141. Fixed. 33 2

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either, or both. The following selected positions are shown on the diagram:

1832.07	311°6	26″13	5*n*	Σ
1836.90	313.1	25.29	3*n*	Σ
1841.70	314.0	24.33	1*n*	OΣ
1845.74	315.7	23.54	1*n*	OΣ
1851.88	317.4	22.54	1*n*	Σ
1864.01	321.9	20.18	7*n*	Δ
1868.85	324.9	19.49	2*n*	OΣ
1875.88	327.6	18.25	1*n*	OΣ
1883.90	331.5	17.19	2*n*	Per
1896.08	339.7	15.56	3*n*	A
1902.82	345.3	14.85	3*n*	Do

[*Pos. Med.* ccxxv ... Ma (*F. S.* I) ... Ma (**X, XIII**) ... K ... K (1519) ... Hd ... Gl ... WS ... WS^2 ... Flm ... Per ... Per (2684) ... Se^1 ... En (2663) ... Do (2989, 3930) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Big ... OΣ (**IX**) (**X**, p. 151) ... Δ (1473) .... Δ (**II**) .... A (3395) .... Coleman (*Mem. R. A. S.* **LIII**) .... *Annals Toulouse Obsy.* **III** ... Sk ... Sk^5 ...]

33^m 30^s **861.** *τ Andromedae.* Distant companion noted with the 18½-inch. The principal star has a small proper motion, 0″019 in 37°4.

1900.69	329°0	52″63	2*n*	β

[β^3 ... β^5 ...]

33 32 **862.** **Σ 143.** Rectilinear motion; the measures give an annual movement of 0″086 in the direction of 139°.

1831.76	319°8	30″31	2*n*	Σ
1865.35	320.1	33.02	4*n*	Δ
1879.91	319.7	34.42	3*n*	β
1896.04	319.2	35.62	3*n*	A
1904.71	319.6	36.57	2*n*	β

[Ma (*F. S.* **II**) ... Δ (1572) ... Δ (**II**) ... Flm ... β^3 ... β (*Ast. and A.-P.* **XIII**, 19) ... A (3395) ... HΣ (**XII**) ... β^6 ...]

33 33 **863.** **H 641.** Probably fixed.

1836.7	131°3	3″±	1*n*	H
1879.76	129.5	5.57	2*n*	Cin
1904.70	127.3	5.52	2*n*	β

[H (**VIII**) ... Cin^6 ... β^6 ..]

33 33 **864.** **H 2067.** The distance in my measure in 1878 is printed 23″90 instead of 33″90. The distance of 5″ in H probably should be 25″. The measure credited to this pair by Wilson belongs to H 3455, which is about 4^m *f* this. There is no indication of change in H 2067.

1878.87	91°5	33″90	1*n*	β
1897.74	91.3	33.97	3*n*	Doo
1901.81	91.6	33.86	2*n*	β

[β^3 ... Wilson (Cin^{10}) ... Doolittle (*Pub. Flower Obsy.* I) ... β^6 ...]

34 15 **866.** **Σ 144.** Without change.

1868.69	293°0	15″30	4*n*	Δ
1904.70	293.7	15.78	2*n*	β

[Ma (*F. S.* I) ... Ma (**XI**) ... H (**VII**) ... Δ (**II**) ... β^6 ...]

867. **Doo 4.** Discovered by Doolittle. The place given by him (*Pub. Flower Obsy.* I) is that of a bright star about 11′ *n*, with which he compares it. That star is H 1088 (No. 868). The faint pair is not in the DM. 34^m 16^s

868. **H 1088.** This star has a small proper motion. 34 20

Bossert	0″090 in 102°9	
A. G. Hels.	0.079 in 104.7	

1901.79	167°6	19″46	2*n*	β	7.0...9.5

[β^6 ... Espin (3717) ...]

870. **Σ 145.** Distance may be less. This star has a proper motion of 0″130 in 97°9 (*A. G. Berlin*). 34 36

1869.46	33°3	10″96	4*n*	Δ
1903.85	32.2	10.56	2*n*	β

[Ma (*F. S.* I) ... Ma (**XI**) ... H (**IV**) ... Δ (**II**) ... β^1 ... β^6 ...]

871. **Σ 146.** Apparently fixed. 34 57

1865.69	306°4	23″99	3*n*	Δ
1892.83	306.6	24.29	2*n*	Gla

[Ma (*F. S.* I) ... Ma (**X, XI**) ... En ... Δ (**II**) ... Cin^6 ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ...]

872. 44 *Cassiopeiae.* **β 1103.** Discovered with the 36-inch. Krueger gives the proper motion of the large star as 0″060 in the direction as 103°1. If the companion was fixed in space, its position with reference to A at the date of the last measure would be 347°3: 1″89. The measures show that the two stars are moving together. 35 13

1898.61	4°6	1″73	1*n*	β	...13.0

[β (**XVI**) ... β (2956) (*Pub. L. O.* **II**) (*Pub. Y. O.* I) ...]

874. **See 15.** Discovered at the Lowell Observatory. 35 28

1898.83	312°6	3″04	3*n*	Boothroyd

[See (*A. J.* 431) ... Boothroyd (*A. J.* 505) ... *Mon. Not.* **LXI**, 579 ...]

875. **H 2072.** This is Lalande 3138. 35 45

1877.86	282°8	3″12	3*n*	Cin	8.0...9.0
1886.79	283.6	3.39	2*n*	LM	

[Hd ... Cin^3 ... Cin^4 ... LM ...]

877. χ^1 *Ceti.* **Σ 147.** Not in B. A. C., and not called χ^1 in star catalogues except Bode. There is a slow diminution in the distance. The components have a common proper motion of 0″395 in 173°8 (Porter), and probably make a physical system. 35 48

1856.96	89°6	3″78	2*n*	Morton
1867.07	87.7	3.49	4*n*	Δ
1880.05	87.9	3.53	3*n*	Sp
1895.91	89.5	3.52	2*n*	Maw
1904.70	89.1	3.12	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H^1...H^2...H (V)...Da^2...Δ (1204)...Δ (I, II)...Se...Se^3...Ek (I)...Wr...Flm...OΣ (IX)...Sk^3...Cin^4...Cin^6...Wilson (Cin^{10})....LM...Lv^1....Sp (II)....Jones (*Proc. Haverford Coll. Obsy.* 1891-92)...Glasenapp (II)...Scott (*Brit. Ast. Assn.* V, 75) (*Mon. Not.* LIX, 427)....Collins (*A. J.* 378)....Do (3378)....Maw (III)....*Annals Toulouse Obsy.* III...β^6...]

35m 49s **878.** **H 2069.** The only measures are by Espin (3717) (*Mon. Not.* LXIV, 678).

1900.02	240°.4	20″.11	2*n*	Es	9.2...9.3

35 53 **881.** **H 2076.** Nothing since the following:

1835.9	101°.1	4″ ±	1*n*	H (VIII)

35 58 **882.** 107 *Piscium*. **H 2071.** "A third 14–15 m." H has

star from Krueger is 0″.036 in the direction of 152°.9, and the components are moving together. The following are all the measures:

1880.81	68°.9	1″.02	3*n*	β
1888.82	59.5	0.76	3*n*	Sp
1891.60	59.7	1.11	3*n*	β
1898.61	54.4	1.20	1*n*	β
1900.80	52.5	1.14	2*n*	A
1900.91	52.3	1.17	4*n*	Doo

[β (XIII)...β^3...β (3114) (*Pub. L. O.* II) (*Pub. Y. O.* I)...Sp (III)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* I)...A (*Bul. L. O.* No. 11)...]

892. **OΣ 34.** Orbital motion is probable. 36m 43s

1843.33	110°.5	0″.40	2*n*	Ma
1847.57	113.7	0.60	3*n*	OΣ
1868.70	121.3	obl.	4*n*	Δ

37^m 24^s **899.** **H 18.** This is near the place of the small star, DM (11°) 225. That has a fainter distant star:

1904.76	75°.3	76″.94	1*n*	β^6	9.5... 9.8

No pair found like H 18.

37 25 **900.** **β 509.** Discovered with the 18½-inch. Slow retrograde motion. In a low-power field with Σ 155, 28^s.9 *p* and 5′.6 *n*.

1890.47	258°.0	0″.70	3*n*	Sp
1891.74	259.2	0.70	3*n*	β
1897.92	251.8	0.83	3*n*	A
1899.00	254.8	0.59	1*n*	β
1900.36	252.2	0.73	6*n*	Doo
1902.23	251.8	0.71	3*n*	Bryant

[β (**X**..)..β^1....β (3114) (*Pub. L. O.* **II**).... Sp (**III**).... A (*A. J.* 429).... Brown (3645).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LXI**, 486; **LXII**, 383; **LXIV**, 790)...]

37 31 **901.** **H 3455.** The components are SD (18°) 291 and 292. Wrongly identified in Wilson (Cin^{10}), and R. A. about 4^m too small.

1882.70	73°.2	23″.90	1*n*	Wilson
1901.81	74.0	23.64	2*n*	β^5

37 33 **902.** **H 3456.** The only later measure is:

1897.75	347°.8	14″.95	1*n*	See (3495)

37 36 **903.** **Σ 148.** The angle is increasing.

1853.46	134°.1	1″.37	2*n*	OΣ
1869.12	135.5	1.12	4*n*	Δ
1893.05	140.8	1.74	1*n*	Gla
1904.68	141.6	1.48	3*n*	Miller

Ma (*F. S.* **I**)...Ma (**XII, XIII, XV**)...H (**IV**)...Se...Gl...Δ (**II**)...OΣ (**IX**)... Glasenapp (**II**)...J. A. Miller (   )...]

37 38 **904.** **H 2075.** The later measures are:

1904.69	49°.0	13″.24	1*n*	Cogshall

37 48 **905.** **Σ 154.** (= **H 2078.**) Without change.

1869.28	126°.8	5″.15	4*n*	Δ
1904.72	126.5	5.08	2*n*	β

[Ma (*F. S.* **I**)...Ba (**II**)...Bp...Wr...Se...Ra (**XXIII**)...Du...Δ (1204)...Δ (**I, II**)...β^6...]

37 54 **907.** **Σ 155.** (= **H II. 49.**) Probably without change.

1866.05	328°.9	4″.53	3*n*	Δ
1876.10	327.6	4.75	2*n*	Hl
1887.03	328.5	4.78	3*n*	Hl
1897.89	328.3	4.59	6*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Ba (**II, III**)...Se...Se^2...Se^3...Wr...Da^2... Ra (**XXIV**)... Bp... Δ (*Mem. Accad. Sci.*)... Δ (1011)... Δ (**I, II**)...WS... Gl....Ferr....Pl....Sp (**II**)....T (2898)....Lv^1....Hl (**I, II**)....Jones (*Proc Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...Lewis (*Mon. Not.* **LVI**, 359; **LXI**, 486)...*A. G. Leipzig*, p. 246...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...]

908. **Σ 152** *rej.* The only later observation is: 37^m 55^s

1904.61	62°.0	32″.57	1*n*	β^6	...9...11

909. **Duner 1.** In a coarse cluster, with many similar pairs. 38 :

1903.63	38°.2	7″.10	2*n*	β^6	9.5... 9.6

911. **Σ 153.** No change. 38 20

1866.98	68°.2	7″.48	3*n*	Δ
1904.68	67.6	7.23	3*n*	Cg

[Ma (*F. S.* **I**)...Ma (**XI**)...Du...β^3...Δ (**II**)...Cogshall (   )...]

912. **H 2079.** "Large star very red." The only measures are: 38 33

1902.78	301°.4	15″.75	3*n*	β^6	9.3...12.3

913. **β 6.** Discovered with the 6-inch. Without change. 38 43

1877.80	166°.8	2″.70	2*n*	Cin
1886.92	166.1	2.62	2*n*	LM
1888.65	167.6	2.65	3*n*	Lv
1893.81	168.0	2.61	3*n*	W

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Δ (**I**)...Cin^4...LM...Lv^1...Wilson (   ) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

916. **H 2080.** A decided change in the angle. 39 10

1902.78	156°.1	15″.08	3*n*	β^6	9.7...13.2

919. **H 643.** "A third star 13 m, 190° : 10″." The three stars make a very perfect equilateral triangle. 39 24

AB	1904.61	223°.8	14″.35	2*n*	β^6	10.0...10.3
AC	1904.61	168.1	13.67	2*n*	β^6	...11.0

920. **A. G. 23.** From *A. G. Leipzig*. Measured at the Kirkwood Observatory. 39 25

1902.86	45°.3	29″.31	3*n*	Miller

922. **β 784.** Discovered with the 15½-inch at the Washburn Observatory. Probably without change. 39 34

1887.79	47°.9	2″.16	3*n*	Com
1899.95	45.9	2.05	3*n*	Doo

[β (**XII**) ... β^4 ... Com (*Pub. Washburn Obsy.* **VI**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

923. **β 736.** (AC = **Σ 157.**) The duplicity of the principal star of Σ 157 was discovered with the 6-inch. Thus far no change is shown. The distant star appears to be fixed. All the other measures of both companions are given below: 39 38

A and B

1890.90	209°.3	0″.77	3*n*	β
1898.76	207.5	0.82	1*n*	β
1898.77	210.5	0.86	3*n*	Hu
1899.07	193.9	1.02	1*n*	Lewis

A and C (= Σ 127)

1845.08	113°.9	11″.49	1*n*	Ma
1850.72	117.5	12.69	1*n*	Ma
1865.49	116.0	12.19	3*n*	Δ
1879.87	115.8	12.40	2*n*	β
1890.90	115.9	12.56	3*n*	β
1898.75	115.4	12.55	3*n*	β
1898.77	116.6	12.79	3*n*	Hu
1899.47	116.1	12.41	2*n*	Lewis

[β (**XI**) . . . β^2 . . . β^3 . . . β (3048) (*Pub. L. O.* **I, II**) (*Pub. Y. O.* **I**) . . . Δ (**II**) . . . Ma (**XIII**) (*F. S.* **I**) . . . Lewis (*Mon. Not.* **LIX**, 400; **LX**, 495) . . .]

(See p. 1059)

$39^m\ 50^s$ **925.** **Σ 156.** Companion not seen by Δ 1864–65. I found it very plain with the 6-inch in January 1876. It is the *p* of two stars in the field. The only recent measure is:

1897.45	96°.5	5″.64	5*n*	Doo

931. **H 1091.** The only measures are by Espin (*Mon. Not.* LXIV, 678). $40^m\ 24^s$

1904.05	152°.3	27″.66	2*n*	Es	8.5 . . . 8.9

934. **Σ 159** *rej.* Measures and magnitudes from H (V). In *Cat. Nov.*, Cl. IV, 8 . . . 10. Examined in 1876, and identified in DM; larger star 9 m. 40 54

935. **Σ 161** *rej.* From *Catalogus Novus.* 40 55

1903.85	206°.2	21″.50	2*n*	β^6	8.3 . . . 9.3

940. **Σ 166.** Without change. 41 48

1867.46	1°.7	7″.50	4*n*	Δ
1879.77	0.4	8.00	2*n*	Cin

42^{m} $:^{s}$ **945.** **Egbert** 1. Discovered at Cincinnati by Egbert (Cin[6]). Rough place given, and only a single measure. I examined this region in 1903, and found no such pair in or near this place. There must be a large error in the position. In the course of this search two small pairs were measured, Nos. 948 and 972.

42 4 **946.** **β** 510. (AC = **H V. 92.**) The close pair was discovered with the 18½-inch. The measures show slow retrograde motion. All the other measures of both companions are given. C is DM (15°) 266.

A and B

1891.92	335°3	1″54	3*n*	β
1895.90	333.9	2.08	1*n*	Lewis
1900.81	329.4	1.66	3*n*	Doo
1903.93	327.3	1.51	1*n*	Lewis

A and C

1878.06	326°4	53″56	1*n*	β
1891.92	327.2	53.35	3*n*	β

[β (X)...β1...β (3114) (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LVI**, 359; **LXIV**, 790) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

42 11 **948.** This was measured in looking for No. 945, which could not be found. There is a 14 m star making an equilateral triangle, from A 45°3, and from B 122°8.

42 12 **949.** **Σ** 164. Without change.

1867.43	95°2	9″60	3*n*	Δ
1904.69	95.4	9.87	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...Gl...Δ (**II**)...J. A. Miller ( )...]

42 22 **950.** **H** 644. "Large star red." No color noticed in 1878, or 1903.

1879.81	279°6	17″99	2*n*	β	7.0...11.4
1903.73	279.1	17.19	3*n*	β	7.7...11.4

[Cin6...β3...β6...]

951. **Σ** 163. No change since Struve.

1866.70	34°4	34″88	3*n*	Δ
1903.64	35.3	34.50	3*n*	β

[Ma (*F. S.* **II**)...Bl (**V**)...Δ (**II**)...Espin (*Mon. Not.* **LXIV**, 676)...β6...]

42 35 **953.** **β** 511. (AB = **Σ** 171.) The companion to B was discovered with the 18½-inch. There is probably no change to this time. The distance of AB is increasing. The motion is undoubtedly rectilinear. This change from 1829 to 1898 gives for the proper motion of A, 0″046 in the direction of 2°4. All the measures of AB are given.

B and C

1878.29	316°0	3″69	3*n*	β
1891.92	317.4	3.91	3*n*	β
1898.71	315.2	3.81	2*n*	β
1898.72	315.2	4.11	3*n*	Bd

A and B (= Σ 171)

1829.91	157°6	27″89	2*n*	Σ
1865.44	159.1	29.14	5*n*	Δ
1879.05	159.6	29.68	7*n*	β
1891.92	159.9	30.23	3*n*	β
1898.71	160.0	30.83	2*n*	β

[β (X)...β1...β3...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β (*Ast. and A.-P.* **XIII**, 17)...Δ (**II**)...Ma (*F. S.* **II**)...Boothroyd (*A. J.* 478)...]

956. **β** 1016. Discovered with the 18½-inch. Without change. 42^{m} 52^{s}

1898.79	209°6	0″67	3*n*	Hu
1899.66	206.8	0.57	11*n*	Gr. Obsy.
1900.90	207.8	0.58	3*n*	Doo

[β (**XIII**)...β3 (App)...β (3048) (*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)... Doolittle (*A. J.* 547)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...]

957. **β** 1001. Discovered with the 12-inch. Probably unchanged. The later measures are: 43 5

1893.81	358°2	0″98	1*n*	W
1898.89	6.0	0.97	2*n*	Cg
1900.80	4.3	1.16	1*n*	Doo

[β (**XIII**)...β3...Wilson ( )...Cogshall (*A. J.* 478)...Doolittle (*A. J.* 547)...]

958. **Σ** 168. Not seen double by H (IV), and I failed to see the companion with the 6-inch in 1874. The magnitude in DM is 9.1. Probably unchanged. 43 6

1867.45	219°7	1″97	3*n*	Δ	8.7...11.2
1901.76	223.4	1.80	2*n*	β	8.5...10.0

[Ma (*F. S.* **I**)...Δ (**II**)...β (*Mon. Not.* **XXXIV**, 370)...β5...]

960. **Σ** 167 *rej.* From *Catologus Novus.* The principal star has a proper motion of 0″325 in 106°5 (Schroeter). The only measures are: 43 12

1903.89	15°1	15″50	2*n*	β6	8.7... 9.9

961. **Σ** 172. No change. 43 16

1866.78	194°3	17″56	3*n*	Δ
1903.85	194.2	17.69	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β6...]

962. **β** 1313. Discovered with the 18½-inch of the Dearborn Observatory in 1903. Near Σ 172 (β6). 43 26

963. 1 *Arietis.* **Σ** 174. (= **H I. 73** = **S** 401.) Some of the measures are not very accordant for so easy a pair, but the stars are evidently fixed. *A. G. Berlin* gives the components different proper motions: 43 31

A = 0″043 in 271°3
B = 0.041 in 222.9

1782.97	167°4	....	1*n*	♅
1856.16	167.7	2″75	3*n*	Se
1869.01	168.5	2.66	5*n*	Δ
1871.11	167.6	2.76	2*n*	Du
1896.45	165.8	2.87	4*n*	Coleman

[Ma (*F. S.* **I**) ... Ma (**X**) ... Mh ... Wr ... Ra (**XXIII**) ... Δ (*Mem. Accad. Sci.*) ... Δ (1013, 1209) ... Δ (**I, II**) ... Per ... Per (2684) ... T (2866) ... Maw (**I**) ... Jones (*Proc. Haverford Coll. Obsy.* 1892) ... Glasenapp (**II, III**) ... Solá (3497) ... Knorre (3518) ... Coleman (*Mem. R. A. S.* **LIII**) ...]

43^m 38^s **964.** **Σ** 173 *rej.* From H (IV).

1879.66	203°4	22″48	1*n*	Cin	8.5...10.0
1903.85	203.6	22.87	2*n*	β	8.5...10.0

[H (**IV**) ... Cin⁶ ... β⁶ ...]

43 48 **966.** **β** 1168. Discovered with the 36-inch. It is 1^m 44^s *p* and 2′4 *s* of ζ *Ceti.*

1899.00	202°0	0″72	1*n*	Bd
1899.66	208.8	0.31	4*n*	A

[β (**XVII**) ... β (3047) (*Pub. L. O.* **II**) ... A (*Bul. L. O.* No. 11) ... Boothroyd (*A. J.* 478) ...]

43 54 **968.** **Σ** 169. Fixed.

1868.65	133°2	5″38	4*n*	Δ
1904.68	133.6	5.14	3*n*	Miller

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**IV, V**) ... Gl ... Δ (**II**) ... J. A. Miller ( ) ...]

44 17 **971.** **β** 1169. Discovered with the 12-inch. Unchanged.

1898.71	203°5	2″35	2*n*	β
1898.73	206.7	2.32	3*n*	Hu
1899.85	203.5	2.43	3*n*	Doo

[β (**XVII**) ... β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... Hu (*Bul. L. O.* No. 44) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

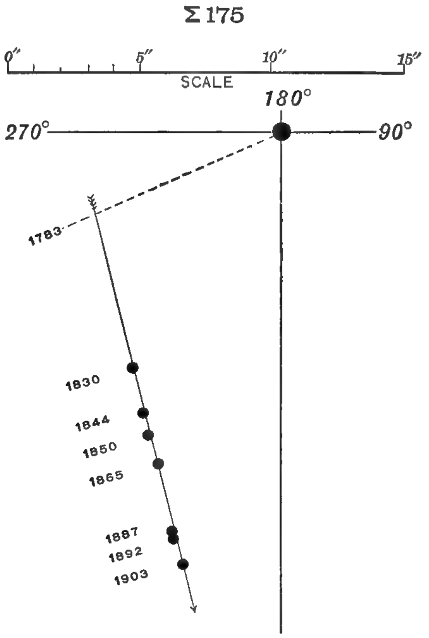
44 19 **972.** **A. G.** 24. Double in *A. G. Bonn.* Measured by β⁶ in trying to find No. 945.

44 24 **973.** **Σ** 170. Relatively fixed.

1865.44	247°8	3″25	3*n*	Δ
1876.96	247.8	3.30	5*n*	OΣ
1895.45	247.0	3.25	6*n*	Com

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Se ... Ra (**XXIII**) ... Δ (*Mem. Accad. Sci.*) Δ (1011) ... Δ (**I**, pp. 37, 401) (**II**) ... Wr ... Du ... Cin⁴ ... Cin⁵ ... Pt ... Cin⁶ ... L de Ball (3017) ... Big ... Glasenapp (**I, II**) ... En (2662) ... **OΣ** (**X**, p. 203) ... Com (*Pub. Washburn Obsy.* **VI, X**) ... Knorre (3518) ...]

44 25 **974.** **Σ** 175. (= ♅ II. 56.) Recent measures show a considerable direct motion in angle, with increasing distance. Σ did not remark the identity of his pair with that of ♅, whose angle of 293°2 (1783.58) confirms the change. This is obviously due to proper motion. The measures of Σ and β give 0″108 in the direction of 196°0.



1783.58	293°2	.....	1*n*	♅
1830.12	327.9	10″43	4*n*	Σ
1844.06	334.0	11.81	2*n*	Ma
1850.98	336.4	12.44	1*n*	Ma
1865.21	339.7	13.34	7*n*	Δ
1887.93	344.8	15.55	3*n*	Hl
1892.93	345.2	15.86	2*n*	Gla
1903.77	348.5	16.80	4*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Gl ... Flm ... Sk ... Gore (*Liverpool Ast. Soc.* **VI**, 211) ... T (2898) ... Δ (1473) ... Δ (**II**) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2989, 3930) ... H (**II**) ... Big ... Maw (**I**) ... Glasenapp (**II**) ... Sk⁴ ... Sk⁵ ... Solá (3497) ... Coleman (*Mem. R. A. S.* **LIII**) ... *Annals Toulouse Obsy.* **III** ... Furner and Storey (*Mon. Not.* **LXIV**, 443) ...]

975. **Hd** 54. The only later observations are from β⁵: 44^m 26^s

AB	1900.72	116°9	4″33	2*n*	β	8.6...11.2
AC	1900.72	211.4	15.54	2*n*	β	...11.2

977. **Ho** 311. Probably without motion. 44 32

1890.92	177°5	0″37	3*n*	β
1900.90	180.8	0.39	12*n*	Gr. Obsy.

[Ho (*A. J.* 215) ... β (3048) (*Pub. L. O.* **II**) ... Ho (3233, 3558) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 790) ...] (See p. 1059)

978. **Arg.** 6. "Duplex, Cl. IV" in *O. Arg.* Looked up many years ago and estimated as given. Since this was in type, it has been measured: 44 39

1904.72	137°1	14″17	2*n*	β⁶	8.0...10.3

$45^m\ 13^s$ **980.** **Σ** 177. Change in distance is probable.

1829.87	121°9	34″27	2*n*	Σ
1866.07	122.0	33.87	3*n*	Δ
1878.93	121.5	33.60	3*n*	β
1897.55	121.9	33.11	4*n*	Doo
1903.92	121.5	32.90	2*n*	β

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . Cin⁶ . . . β³ . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . β⁶ . . .]

45 40 **981.** **Σ** 178. (= **H** I. 56.) Change in angle is probable.

1866.06	196°5	3″12	3*n*	Δ
1886.93	197.4	3.14	2*n*	HΣ
1904.74	200.6	3.05	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**X**) . . . Bp . . . Ba (**II, III**) . . . Δ (1118) . . . Δ (**I, II**) . . . Ra (**XXII**) Wr . . . Se . . . Se³ . . . Mh . . . Gl . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Glasenapp (**II, III**) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . *A. G. Leipzig* p. 206 . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . . β⁶ . . .]

45 43 **983.** **H** 645. The only measures are:

1902.68	104°6	7″82	2*n*	β⁶	9.1 . . . 10.7

46 4 **986.** **Σ** 3113. (= **H** 2091.) No sensible change since Struve.

1869.24	268°6	1″27	4*n*	Δ
1897.68	269.5	1.39	3*n*	Doo

[Ma (*F. S.* **I**) . . . Se . . . Δ (**II**) . . . Cin⁶ . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

46 4 **987.** **OΣ** 36 *rej.* Given as a 15″ pair in the first edition of the *Pulkowa Catalogue*, and subsequently rejected. The only other observation is by Ma (XIII), 337°4 (1846.12) 1*n*. Nothing found here by Hussey (*Pub. L. O.* V).

46 6 **988.** *Andromedae* 241. **Σ** 179. (= **H** I. 89 = **S** 402.) No change.

1869.31	159°9	3″32	5*n*	Δ
1904.68	160.1	3.32	3*n*	Cogshall

[Ma (*F. S.* **I**) . . . Ma (**X, XIII**) . . . Da² . . . Δ (*Mem. Accad. Sci.*) . . . Δ (1013) . . . Δ (**I, II**) . . . Wr . . . Ra (**XXIII**) . . . Se . . . Du . . . Per . . . (2684) . . . Glasenapp (**III**) . . . Knorre (3518) . . .]

46 6 **989.** 55 *Andromedae.* **H** 1094. Described by H as "a fine nebulous star," but this is probably a mistake, as no such appearance has been noted since. The bright star has a proper motion of 0″028 in 270°0 (Auwers). The only measures are:

1879.22	355°2	60″13	2*n*	β³	. . . 12.0
1903.70	355.5	59.78	2*n*	β⁶	. . . 12.7

46 20 **990.** **β** 259. Discovered with the 9.4-inch of the Dartmouth College Observatory. Probably without change.

1877.86	236°8	4″25	3*n*	Cin
1889.97	239.7	4.52	2*n*	Lv
1898.69	237.8	4.56	3*n*	Cg
1899.92	237.0	4.90	3*n*	Hu

[β (**V**) . . . . Δ (**I**) . . . . Cin⁴ . . . Lv¹ . . . Cogshall (*A. J.* 478) . . . . Hu (*Bul. L. O.* No. 44) . . .]

992. **β** 260. Discovered with the 6-inch. Slow motion in angle is probable. $46^m\ 45^s$

1884.97	230°6	0″64	2*n*	Ho
1897.98	234.0	0.70	2*n*	Brown
1899.87	236.3	0.78	5*n*	Doo
1903.48	238.4	0.65	3*n*	Bowyer

[β (**V**) . . . β (*Mon. Not.* **XXXV**, 31) . . . Δ (**I**) . . . Ho (2978) . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Brown (3645) . . . Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**) . . . Bowyer (*Mon. Not.* **LXIV**, 790) . . .]

993. γ *Arietis.* **Σ** 180. (= **H** III. 9 = **Sh** 20.) Discovered by Hooke in 1664, and the second double star seen by any observer. The two stars have remained relatively fixed. Many unnecessary measures have been made, as will be seen from the references below, since there has never been at any time any indication of relative change. The components have a common proper motion of 0″113 in 147°2 (Auwers), and therefore probably make a physical system. The following positions will be sufficient to show their fixity since Σ: 46 56

1841.78	358°3	8″82	3*n*	Ma
1847.93	358.2	8.62	2*n*	Da
1857.48	358.9	8.86	4*n*	Se
1865.48	359.2	8.77	3*n*	Δ
1886.98	359.7	8.54	3*n*	Hl
1896.87	359.8	8.43	3*n*	Lewis
1901.93	359.4	8.02	2*n*	Do

The distant star, C, is from Sh. In 1878 I found this to be a close and difficult double star. (See β 512.) There is a minute star between the two pairs.

γ *Arietis* (A) and β 512

1878.71	84°3	223″82	1*n*	β
1898.92	83.9	223.23	1*n*	β
1904.79	84.2	222.85	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**IX, X, XI, XII, XIII, XV**) . . . Ma (304, 324) . . . Bes . . . K . . . Wn (1738) . . . P¹ . . . H¹ . . . H² . . . K (409) . . . Da¹ . . . Da³ . . . Fl . . . Bp . . . Ba (**I, II**) Ra (**XXI**) . . . Ek (**I**) . . . Mh . . . H (**V**) . . . Lu (**I, II, III**) . . . Lu (1103) . . . Peters (1042) . . . Auwers (1393) . . . Gl . . . Du . . . Pogson (*Brit. Assn. Rep.* 1858) . . . Se . . . Se³ . . . Wh . . . Wr . . . Wr (*Phil. Trans.* 1851) . . . Goldney (2257) . . . Pk . . . Sk³ . . . Je (2324) . . . Lassell (858) . . . Lassell (*Mon. Not.* **XIII**, 183) . . . Pt . . . Do (2196, 2989, 3680, 3798) . . . Do (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Franz (2590) . . . Per . . . Per (2684) . . . T (2866) . . . Δ (*Mem. Accad. Sci.*) . . . Δ (1013, 1209) . . . Δ (**I, II**) . . . Engelhardt (**II**) . . . Hl (*Wash. Obsns.* 1886) . . . Hl (**II**) . . . Giacomelli (**I**) . . . Hayn (3051) . . . Collins and Jones (*Proc. Haverford Coll. Obsy.* 1891–92) . . . OΣ (**IX**) (**X**, p. 151) . . . Glasenapp (**II, III**) . . . β³ . . . Big (*Bul. Ast.* **XII**, 299) . . . . Cohn (3240) . . . . Hagen (3258) . . . . Chofardet (3450) . . . . Solá (3497, 3563) . . . . Coleman (*Mem. R. A. S.* **LIII**) . . . . *Annals Toulouse Obsy.* **III** . . . . HΣ (**XII**) . . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LVI**, 359; **LIX**, 400) . . . . β⁶ . . . .]

994. **β** 512. Discovered with the 18½-inch. This star is a distant companion to γ *Arietis.* The measures are not sufficient to decide as to relative motion. 47 12

1890.58	23°8	1″64	3*n*	β	8.6 . . . 11.7
1897.86	17.2	1.84	1*n*	Lewis	8.6 . . . 11.7
1898.88	18.3	1.97	1*n*	A	8.0 . . . 12.5
1898.96	23.8	1.54	3*n*	β	8.9 . . . 13.2

The measures connecting this star with γ *Arietis* are given above.

[β (**X**) . . . β¹ . . . β (3048) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . Lewis (*Mon. Not.* **LVI**, 359; **LIX**, 400) . . . A (3584) . . .]

$47^m\ 21^s$ **995.** β 183. Discovered with the 6-inch. Apparently fixed.

1879.77	226°7	2″42	1*n*	Cin
1882.76	229.6	2.72	1*n*	W
1885.95	227.5	2.40	1*n*	LM
1893.81	227.6	2.62	2*n*	W
1898.85	229.2	2.60	3*n*	Bd

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Δ (I) ... Cin^3 ... Cin^4 ... Cin^6 ... Wilson (Cin^{10}) ... LM ... Boothroyd (*A. J.* 478) ...]

47 29 **996.** **H** 3472. The only observation since is the position-angle, 238°1 (1875.91) 2*n* Cin^3.

47 32 **997.** **Σ** 181 *rej.* From *Catalogus Novus.* Noted as double in *A. G.*

AB	1904.69	304°4	26″74	2*n*	Miller	8.5... 9.7
BC	1904.69	258.3	28.21	2*n*	Miller	...11.7

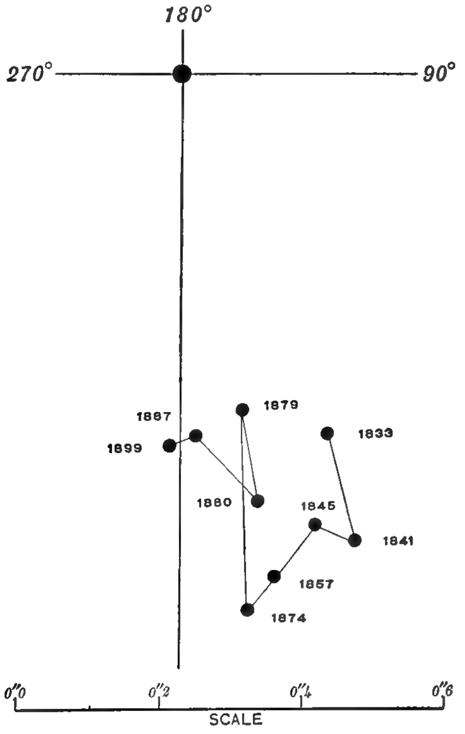
47 58 **998.** Σ 182. Unchanged. Espin measures a third star, 13 m, 71°: 32″.

1868.83	302°3	3″58	4*n*	Δ
1897.15	303.6	3.91	3*n*	Coleman

[Ma (*F. S.* **I**) ... H (**IV**) ... Ma (**XI**) ... H^1 ... Se ... Gl ... WS ... Ra (**XXIII**) ... Δ (1118) ... Δ (**I. II**) .... Glasenapp (**II**) .... Espin (*Brit. Ast. Asso.* **III**, 227) (*Mon. Not.* **LXIV**, 676) ... Coleman (*Mem. R. A. S.* **LIII**, **LIV**) ...]

48 : **1000.** **Lewis** 1. Discovered by Lewis. Place approximate. (*Mon. Not.* LIX, 402.)

48 17 **1002.** Σ 183. (AC = **S** 403.) Very little, if any, change in the distant star, but the close pair is in slow motion, and probably a binary system. The measures are very discordant in distance, and at most only show a slow change in the angle.



Σ 183

A and B

1833.12	22°3	0″55	3*n*	Σ
1841.70	20.4	0.70	1*n*	OΣ
1845.73	16.5	0.66	1*n*	OΣ
1857.20	10.6	0.72	2*n*	OΣ
1874.33	7.2	0.76	3*n*	Δ
1879.90	10.3	0.48	4*n*	Hl
1880.94	10.2	0.61	3*n*	β
1887.96	2.4	0.51	4*n*	Hl
1899.52	358.9	0.52	4*n*	Lewis

AB and C

1850.46	163°8	5″69	4*n*	OΣ
1869.62	164.9	5.74	5*n*	Δ
1880.71	165.7	5.61	2*n*	β
1887.96	162.9	5.74	4*n*	Hl
1903.69	162.7	5.32	4*n*	Bowyer

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H^1 ... H (**IV**) ... Da^1 ... Da^2 ... Do (2989) (*Trans. R. I. Accad.* **XXIX**, Part 13) ... Gl ... Flm ... Hl (**I, II**) ... Δ (1573) ... Δ (**II**) ... β^3 OΣ (**IX**) ... Sk^3 ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXII**, 383; **LXIII**, 403; **LXIV**, 790) .... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**) ...]

1007. **H** 2090. The only measure is from the Kirkwood Observatory. There is a difference of 100° in the angles. $49^m \pm^s$

1904.69	243°9	3″52	1*n*	Cogshall

1008. 56 *Andromedae.* Σ 4, **App. I.** The smaller star is P I^h. 203. The change is due to proper motion, which is given by Porter: 49 1

A = 0″157 in 83°0
B = 0.025 in 276.8

The measures give an annual movement of 0″145, so it is evident that the change is mainly, if not altogether, due to the motion of A.

1865.42	301°4	181″72	9*n*	Δ
1879.40	301.0	183.48	7*n*	Je
1903.85	300.3	187.35	2*n*	β

I have measured a faint star nearer A, not previously observed:

A*a*	1903.86	79°6	18″39	3*n*	β	...11.4

[Bl (**V**) ... Δ (1475) ... Δ (**II**) ... Ra (**XXV**) ... Je (2329(... Maiebckato (Obsns. 1892) ... β^6 ...]

1009. **H** 1097. "In Cluster VIII, 32; no particulars." The place is the same as that of the 9.3 m star, DM (37°) 416. (See p. 1059) 49 3

1011. **A. G.** 25. Double in *A. G. Lund.* Measures by β^6 49 7

1014. **A. G.** 26. From *A. G. Leipzig.* The measures do not agree in distance. 49 37

1902.87	310°6	30″62	3*n*	Cogshall

1015. Σ 186. An interesting binary of long period. The Greenwich observers, whose measures are the first after my own in 1891, give the angle as still in the third quadrant, but it is evident that this could not be so, as that would reverse 49 41 the angular motion. There are no measures in the interval of ten years between the Mt. Hamilton and Greenwich observations, but it is certain that there was a change in the position-angle of about 180° during that time, and that the secondary star is now in the first quadrant again. I have very recently (1904) observed it, and the measures confirm the angle of Bowyer, and give a total motion of about 330° since the measures of Struve.

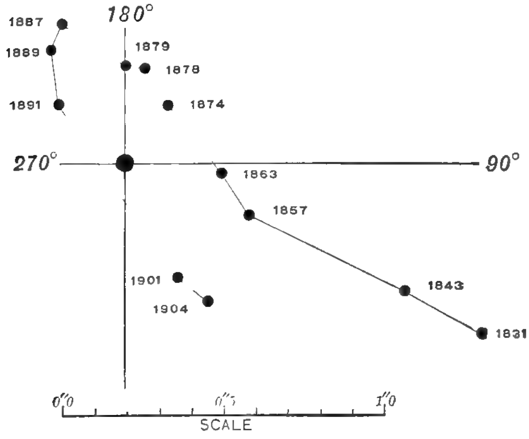
The two stars have a considerable common proper motion:

Porter	0″232 in 27°3
A. G. Nico.	0.249 in 34.4

Glasenapp from measures to 1890 finds a period of 150.8 years. Many of the observations have large errors in both angle and distance. The following will best show the character and extent of the relative motion:

1831.12	64°7	1″23	4*n*	Σ
1843.90	65.5	0.96	1*n*	OΣ
1857.92	67.5	0.42	3*n*	Se
1863.85	85.1	0.3±	1*n*	Du
1874.90	145.7	0.23	1*n*	Newcomb
1878.87	169.0	0.31	1*n*	β
1879.89	180.5	0.31	3*n*	Hl
1887.41	205.3	0.49	4*n*	HΣ
1889.00	214.3	0.43	9*n*	Hl
1891.39	229.9	0.29	7*n*	β
1901.82	24.3	0.39	2*n*	Bryant
1904.75	33.6	0.66	3*n*	β

It is evident from the accompanying diagram that there is nothing in the observations to this time to indicate the approximate maximum distance of the companion in the first quadrant, and that it will be necessary to have measures covering nearly a complete revolution to determine with any certainty the period and other elements of the orbit.



Σ 186.

Hall measured a pair, referred to in his measures of Σ 186, as "near this," 164°0 : 0″55 (1889.01) 1*n*, which I have not been able to identify with certainty. In a very recent examination, made while this catalogue was passing through the press, I found that the 9 m star, DM (1°) 346, which is 18^s *p* and 4′ 29″ *s* of Σ 186, was a close pair:

1904.77 30°4 0″92 2*n* β^6 9.2... 9.5

It will be seen that this does not agree at all with the measures of Hall, and cannot be that pair unless there has been a very decided change since 1889. The place (1880) of this star is:

R. A. = 1^h 49^m 23^s
Decl. = 1° 10′ 36″

[H^1...H^2...Ma (*F. S.* **I**)...Ma (**X, XI**)...Se... Se^2... Se^3...WS...Gl... Da^4 ...Mh...Sk...Hl (**I, II**)...Sp (2132)...Sp (**II**)...Δ (1100, 1736)...Δ (**I, II**) ...En (1673)...Flm ..T (2898)...Lv (*Proc. Haverford Coll. Obsy.* 1891)... LM...Glasenapp (**II**) (*A. J.* 246, 249) orbit...Newcomb (*Wash. Obsns.* 1874) ...OΣ (**IX**)...β^3...β (*Sid. Mess.* **X**, 72)...β (3048, 3114) (*Pub. L. O.* **II**)... Everett (*Mon. Not.* **LVI**, 464).... HΣ (**XII**).... Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIV**, 790)...β^6...]

1018. **A. G.** 27. From *A. G. Leipzig.* The only later measures are from the Kirkwood Observatory: 50^m 31^s

1902.87 261°0 17″67 3*n* Miller 9...11

1019. **Σ** 184 *rej.* From *Catalogus Novus.* 50 31

1830+	357°1	25″±	1*n*	H (IV)	10...11
1904.68	5.6	18.07	3*n*	Cogshall	9...10

1020. **H** 1098. "In the *f* part of a cluster of 15 or 20 stars." 50 33

1021. **Σ** 189. (= **H** 2099.) Without change. 50 34

1866.69	268°9	8″73	3*n*	Δ
1899.06	267.8	8.92	2*n*	Gr. Obsy.

[Ma (*F. S.* **I**)...Ma (**XI**)...Gl...Δ (**II**)...Bowyer and Bryant (*Mon. Not.* **LX**, 495)...]

1023. **H** 1100. There is an error of −20′ in the declination given by H. The large star has a proper motion of 0″031 in 117°0 (Battermann). The only measures are: 50 47

1901.76 310°2 38″82 2*n* β^5 6.3...10.6

1024. **Σ** 188 *rej.* Place and measures from H (IV). "*Very red : fine green.*" Identified later in DM, and measured: 50 49

1901.76 238°4 32″58 2*n* β^5 8.8... 9.4

1025. **S** 404. (= **♅ IV.** 104 = **♅ IV.** 128 = **Σ** 190 *rej.*) The change is probably due to proper motion. 50 49

1783.60	66°6	15″82	2*n*	♅	
1879.84	73.8	23.18	2*n*	β	7.5... 8.7
1903.71	75.7	23.99	3*n*	β	7.7... 8.5

[Espin (3717) (*Mon. Not.* **LXII**, 531)...Doolittle (*Pub. Flower Obsy.* **I**)...β^3... β^6...]

1027. **Σ** 185. Binary in slow angular movement. The stars have a common proper motion: 51 1

Stumpe	0″163 in 111°2
Porter	0.164 in 90.0

The measures are not very accordant for so easy a pair.

1857.94	30°7	1″48	2*n*	Se
1872.31	33.8	1.79	1*n*	OΣ
1881.66	29.9	1.31	3*n*	β
1899.80	24.7	1.52	5*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H (**V**)...Do (2303, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Δ (2194)...Δ (**II**)...Se...OΣ (**IX**)...Gl...β4...Glasenapp (**II**)...Collins (*A. J.* 378)...Sk5...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1059)

51^{m} 15^{s} **1028.** λ *Arietis.* ♅ V. 12. (= **Sh** 23 = **OΣ (App)** 21.)

The proper motions of the two stars are given:

A	Rechenberg	0″114 in 262°5
	A. G. Berlin	0.122 in 262.0
B	Rechenberg	0.115 in 259.5
	A. G. Berlin	0.130 in 252.2

There has been no relative change.

1821.91	45°7	37″89	1*n*	Sh
1868.82	46.2	37.87	4*n*	Δ
1880.48	46.0	37.46	2*n*	β
1891.77	46.5	37.52	5*n*	Franz

[Ra (**XXIII**)...Δ (**I**)...β3...Engelhardt (**II**)...T (2866)...OΣ (**X**, p. 4)...Franz (3464)...Coleman (*Mem. R. A. S.* **LIV**)...]

51 30 **1031.** **A. G. 28.** Double in *A. G. Leiden.* Measures by β6.

51 43 **1033.** **Ho 10.** The only later measures are:

1893.86	196°6	2″58	2*n*	Ho

[Ho (2778, 3234)...]

(See p. 1059)

51 43 **1034.** 58 *Ceti.* **β 7.** Discovered with the 6-inch. Auwers gives the proper motion of this star as 0″025 in the direction of 36°8. The position of the small star, if fixed in space, should be at the date of the last measures in 1898, 6°2 : 2″35. It is probable that the two stars are moving together.

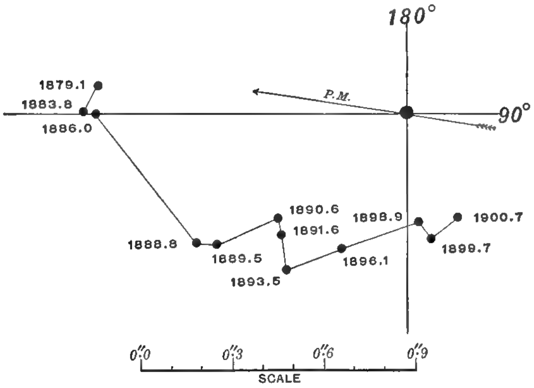
1880.94	12°8	2″73	2*n*	β	6.2...11.0
1886.91	10.9	3.10	4*n*	LM	
1888.99	12.6	2.63	2*n*	T	
1898.63	20.5	2.70	2*n*	β	6.0...10.7
1900.65	12.7	2.89	3*n*	Doo	

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β3...Δ (**I**)...Cin4...LM...Tarrant (2991) Solá (3679)...Doolittle (*Pub. Flower Obsy.* **I**)...]

52 7 **1036.** 48 *Cassiopeiae.* **β 513.** This most interesting binary was discovered with the 18½-inch, but at that time it was easily seen with the 6-inch. It is now a very difficult object, and only measurable with a large aperture under the best conditions. The motion of the companion has been more than a quadrant since the first measures, and it may prove to have a short period, but a much larger arc is required to give even a rough approximation of the orbit.

The principal positions are shown on the accompanying diagram.

Auwers gives the proper motion of this star 0″069 in the direction of 264°2. If the small star did not have this movement its position at the date of the measures in 1896 should be 68°3 : 0″16. It is obvious that the smaller star has the same proper motion, and at the same time a direct motion around the principal star.



48 Cassiopeiae. β 513

The following are all the measures of the close pair:

A and B

1878.69	265°0	1″05	1*n*	Δ
1878.70	264.4	1.04	3*n*	β
1879.23	264.5	0.96	1*n*	OΣ
1879.56	265.6	1.00	2*n*	β
1881.67	271.9	0.76	1*n*	β
1883.78	269.7	1.07	5*n*	En
1885.77	284.9	....	1*n*	HΣ
1886.03	270.1	1.03	4*n*	T
1888.70	298.1	0.83	4*n*	β
1888.99	304.9	0.80	3*n*	Hl
1889.30	294.5	0.69	2*n*	T
1889.52	304.4	0.76	3*n*	β
1890.23	301.0	0.57	2*n*	T
1890.62	308.6	0.55	4*n*	β
1891.61	313.5	0.58	4*n*	β
1892.99	317.2	0.5±	1*n*	Sp
1893.47	322.2	0.65	2*n*	Bar
1896.09	333.7	0.5±	2*n*	Sp
1898.92	5.9	0.36	3*n*	A
1899.72	11.6	0.42	2*n*	A
1900.76	29.3	0.38	1*n*	A
1904.00	65.2	0.40	2*n*	A

A and C

1878.80	49°4	23″98	1*n*	β
1891.62	51.2	23.67	3*n*	β
1898.78	50.3	23.81	3*n*	β

A and D

1898.86	83°3	47″09	1*n*	β	...13

[β (**X**)...β1...β2...β3...β4...β (2875, 2957, 3048, 3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Δ (**I**)...HΣ (**XII**)...OΣ (**X**)...Engelmann (2678)...Tarrant (2876, 3186)...Hall (**II**)...Barnard (*A. J.* 447)...Sp (**III**)...A (3584, 3638) (*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XI**, 45)...]

(See p. 1059)

1037. **Σ 192.** No material change. 52^{m} 23^{s}

1866.35	181°6	4″46	3*n*	Δ
1904.74	180.6	4.46	2*n*	β

[Ma (*F. S.* **I**)...Bl (**V**)...Δ (**II**)...β6...]

$52^m\ 24^s$ **1038.** **Ho 11.** Discovered by Hough, whose later measures are:

1894.82	141°3	4″48	2*n*	Ho

[Ho (2778, 3558)...]

(See p. 1059)

52 34 **1039.** **Σ 194.** Change uncertain.

1870.04	266°8	1″08	5*n*	Δ
1892.96	273.4	1.31	2*n*	Gla

[Ma (*F. S.* I)...H^2...Ma (**X, XI**)...Se...Δ (**II**)...Glasenapp (**II**)...]

52 35 **1040.** **Σ 191.** Without change.

1876.81	191°8	5″48	16*n*	Δ
1879.28	190.4	5.63	17*n*	Hl
1895.45	191.8	5.49	6*n*	Com

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Cin^4...Cin^5...Hl (*Wash. Obsns.* 1878, 1879, 1881)...Hl (**I, II**)...En (2662)...Δ (**I**, p. 403)(**II**)...Com (**VI**)...Big...Pt...L. de Ball (3017)...Glasenapp (**I, II**)...OΣ (**X**)...Com (*Pub. Washburn Obsy.* **X**)...]

(See p. 1059)

52 46 **1041.** **Σ 195.** Probably without motion.

1866.73	191°5	2″95	3*n*	Δ
1904.72	193.0	2.96	2*n*	β

[Ma (*F. S.* **I**)...Se...H (**V**)...Gl...Δ (**II**)...β^6...]

52 54 **1042.** **Σ 193.** No change.

1866.65	193°1	2″87	3*n*	Δ
1904.74	193.5	2.76	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

52 55 **1043.** **Σ 196.** Very little change in AB, but the distance of C has diminished and D increased from proper motion. This movement from meridian observations is given in *A. G. Berlin*:

A	0″129	in	180°0
C	0.02	in	180.0
D	0.183	in	90.0

It seems more probable that the motion is in A alone. Assuming C and D to be stationary, the proper motion of A from the measures of AC is 0″111, and 0″127 from the measures of AD, both in the direction of about 180°. As this is substantially the same as the meridian value, it follows that there is no appreciable proper motion in C and D.

AB	1868.19	56°9	2″26	4*n*	Δ
	1878.76	51.9	2.52	3*n*	β
	1903.86	49.5	2.40	2*n*	β
AC	1868.01	166.2	35.82	4*n*	Δ
	1880.40	165.1	34.31	2*n*	β
	1903.86	164.0	31.84	2*n*	β
AD	1880.40	2.2	184.07	2*n*	β
	1903.86	3.5	187.05	2*n*	β

[Ma (*F. S.* **I**)...Da (*Mon. Not.* **XXIII**, 78)...Kn (*Mon. Not.* **XXIII**, 91)...Sadler (*Mon. Not.* **XXXIX**, 185)...Kn...Flm...β^1...β^3...Δ (**II**)...Solá (3563)...*Annals Toulouse Obsy.* **III**...Do (3930)...β^6...]

53 6 **1044.** 47 *Cassiopeiae.* **Sh 22.** I could not find ♅ V. 84, the place of which in ♅ is the same as this. ♅ gives, 273°5: 50″97 (1783.61) 1*n*, and says it is not Sh 22. The large star has a proper motion of 0″125 in 114°6 (Auwers). The small star, DM (76°) 62, is not moving with it.

1881.62	196°1	95″06	3*n*	β
1887.26	196.5	94.68	2*n*	Eng
1903.72	197.9	94.97	2*n*	β

[β^4...Engelhardt (**II**)...β^6...]

1047. **Sh 24.** *Ceti* 292. (= ♅ II. 58.) The declination in ♅ is 6′ too large. The principal star is Lalande 3684 = Lacaille 586. Both stars in Yarnall; magnitudes 7.2 and 7.4. Probably fixed. $53^m\ 24^s$

1877.86	305°0	8″30	5*n*	Cin
1895.86	304.4	8.50	2*n*	Scott
1902.89	305.0	8.44	1*n*	Scott

[Da^1...Da^2...P^1...J^2...WJ...Cin^4...Sp (**II**)...Wilson (Cin^{10})...Glasenapp (**II**)...Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...]

1048. **Σ 198** *rej.* The components are DM (5°) 275 and 276. The only measures are: 53 52

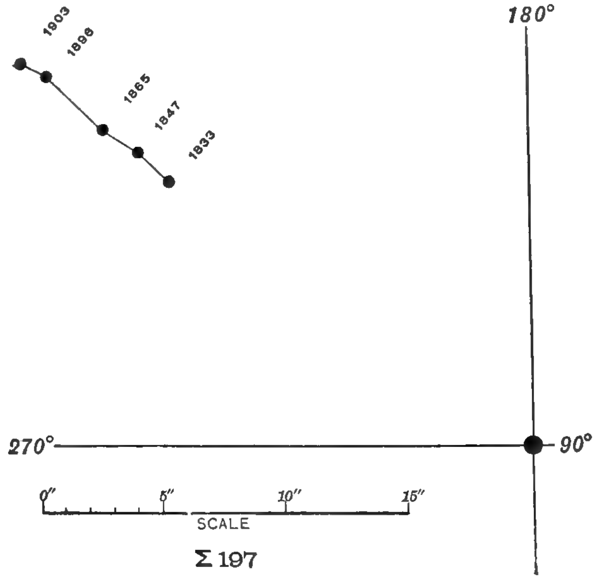
1904.03	117°7	45″46	2*n*	β^6	8.5...8.7

1049. **β 514.** Discovered with the 18½-inch. By a clerical error the angle in β (X) is erroneously printed 285°5. The components seem to be fixed. 53 57

1891.92	134°2	6″36	3*n*	β	8.1...10.0
1898.84	133.0	6.31	3*n*	Bd	8.0...10.2

[β (**X**)...β^1...β (3114)...β (*Pub. L. O.* **II**)...Boothroyd (*A. J.* 478)...]

1050. **Σ 197.** No sensible change in the angle since Struve. The distance is increasing from proper motion. 53 59



Σ 197

About the year 1660 they formed a close pair. The annual proper motion of A from the measures is 0″108 in the direction of about 53°.

1833.48	233°6	18″33	3*n*	Σ
1847.12	232.9	20.07	2*n*	Ma
1865.08	233.3	21.70	6*n*	Δ
1891.02	232.8	24.54	2*n*	HΣ
1896.05	232.3	24.89	3*n*	A
1904.08	233.1	25.91	3*n*	β

[Ma (*F. S.* II) . . . Ma (**XIII, XV**) . . . Gl . . . Flm . . . Δ (1572) . . . Δ (**II**) . . . β (*Ast. and A.-P.* **XIII**, 19) . . . A (3395) . . . HΣ (**XII**) . . . Furner and Storey (*Mon. Not.* **LXIV**, 444) . . .]

$54^m\ 4^s$ **1051.** 49 *Cassiopeiae.* **β** 785. Discovered with the 15½-inch at the Washburn Observatory. The proper motion of this star is given by Auwers as 0″041 in the direction of 242°2. This is nearly in the direction of the small star, and would, therefore, affect only the distance. If the small star was fixed in space, the distance at the date of the last measures in 1898 would be 5″90. The measures show no change in this respect, and there is no doubt that the two are moving together.

1885.87	243°4	5″82	2*n*	HΣ
1888.83	247.3	5.13	4*n*	Com
1889.52	243.7	5.40	3*n*	β
1898.65	244.3	5.35	2*n*	β

[β (**XII**) . . . β⁴ . . . β (2957) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . Com (*Pub. Washburn Obsy.* **VI**) . . . HΣ (**XII**) . . .]

54 28 **1052.** **β** 872. Discovered with the 18½-inch. The measures indicate some change in angle.

1891.97	185°5	4″95	2*n*	β
1898.71	186.5	4.62	2*n*	β
1900.79	186.8	4.70	3*n*	Doo

[β (**XIII**) . . . β³ . . . β (3114) (*Pub. L. O.* **II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

54 29 **1053.** **H** 3476. No large star in Herschel's place in any star catalogue, and in 1876 I could not find a companion to any of the small stars near this place at all corresponding to H 3476.

I have recently identified this as Lalande 3731, which is 1° north of the H place. It is certain that this is the star observed by him. The magnitude in SD is 5.8. The correct place is given in Part I.

1900.72	193°0	61″63	3*n*	β⁵	6.2 . . . 9.8

54 38 **1054.** **β** 515. Discovered with the 18½-inch. The later measures show no material change.

1892.00	244°4	1″31	3*n*	β
1902.71	241.0	1.50	2*n*	Doo

[β (**X**) . . . β¹ . . . β (3114) (*Pub. L. O.* **II**) . . . Doolittle (*A. J.* 547) . . .]

54 53 **1056.** **Σ** 200. No change since Struve.

1866.19	123°8	7″98	3*n*	Δ
1903.74	123.7	8.12	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Δ (**II**) . . . β⁶ . . .]

1057. **OΣ** 37. Probably no real change. The large star is given a proper motion of 0″038 in 94°5 (Battermann). $55^m\ 26^s$

1843.33	223°1	1″39	2*n*	Ma	
1867.73	214.6	1.41	4*n*	Δ	6.7 . . . 8.8
1898.82	214.3	1.48	3*n*	Hu	

[OΣ (**IX**) . . . Ma (**XI**) . . . Do (2322) . . . Flm . . . Δ (1806) . . . Δ (**I**) . . . Big . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Hu (*Pub. L. O.* **V**) . . .]

1059. **Ho** 12. The only other measure is: 55 42

1893.84	100°7	3″29	1*n*	Ho

[Ho (2778, 3558) . . .]

(See p. 1059)

1061. *a Piscium.* **Σ** 202. (= **Ħ II.** 12 = **Sh** 25.) Probably a binary system, but the period is long, and the motion slow. The stars have a common proper motion of 0″025 in 110°6 (Auwers). Much time has been practically wasted in duplicating measures of this pair. The following are sufficient to show the change to this time: 55 50

1830.92	333°0	3″77	6*n*	Bes
1831.16	335.7	3.64	5*n*	Σ
1851.87	330.4	3.56	3*n*	Σ and OΣ
1856.16	327.9	3.35	3*n*	Se
1865.57	325.9	3.15	16*n*	Δ
1872.42	324.9	3.14	6*n*	Δ
1877.82	324.2	3.05	5*n*	Hl
1887.41	322.1	2.96	4*n*	HΣ
1887.49	320.1	2.97	6*n*	Hl
1899.76	319.0	2.96	7*n*	Doo
1901.43	318.7	2.61	4*n*	Do

[Ma (*F. S.* **I**) . . . Ma (**IX, X, XI, XIII, XV**) . . . Ma (304, 324) . . . K (409) . . . K . . . Ra (**XXI, XXVIII, XXXII, XXXIV, XXXV, XXXVI, XXXVIII, XLV**) . . . Bp . . . Ek¹ . . . Ba (**I, II**) . . . Da¹ . . . Da³ . . . J² . . . J³ . . . Fl . . . Wh . . . P¹ . . . En (1673, 2663) . . . Auwers (1393) . . . Lu (**II, III**) . . . WJ . . . WJ² . . . Kn . . . Mh . . . Wr . . . Δ (1013, 1100, 1185, 1473, 1735, 2192) . . . Δ (*Mem. Accad. Sci.*) . . . Δ (**I, II**) . . . Bes . . . Gl . . . OΣ (**IX**) . . . Du . . . Sp (2132) . . . Sp (**II**) . . . Se . . . Se² . . . Se³ . . . Se (1017) . . . WS . . . WS² . . . Pogson (*Brit. Ass'n Rep.* 1858) . . . Wn (**V**) . . . Wn (1738) . . . *Durham Obsns.* 1846-48 . . . Hl (**I, II**) . . . Hl (*Wash. Obsns.* 1876-78) . . . Hl (*A. J.* 265) . . . Pl . . . Sk . . . Goldney (2257) . . . Hd . . . Do (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Je (2324, 2449) . . . Pk . . . Flm . . . Pt . . . Kustner (2584) . . . Franz (2590) . . . T (2866) . . . Lv¹ . . . Hayn (3051) . . . Maw (**I**) . . . Knorre (*Beob. Berlin*, No. 6, 1892) . . . Jones (*Proc. Haverford Coll. Obsy.* 1891-92) . . . Glasenapp (**II, III**) . . . Je (3802) . . . Big (*Bul. Ast.* **XII**, 299) . . . Cohn (3240) . . . Collins (*A. J.* 378) . . . Knorre (3300) . . . Ebell (3321) . . . Searle (*A. J.* 299) . . . Knorre (3518) . . . Coleman (*Mem. R. A. S.* **LIII, LIV**) . . . Sk⁵ . . . Do (2196, 3680, 3798) . . . Solá (3679) Doolittle (*Pub. Flower Obsy.* **I**) . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . .]

1062. **Σ** 203 *rej.* Since Part I was in type, I have looked this up, and find that it is in the field *f* the 8.5 m star, DM (18°) 261, the place of which is: 55 55

R. A. $1^h\ 55^m\ 45^s$ }
Decl. 18° 48′ 27″ }

The only measures are:

1830+	330° ±	12″ ±	1*n*	H (V)	11 . . . 11
1904.72	327.2	14.59	1*n*	β⁶	10 . . . 10.1

The DM star has a 10 m companion, 129° : 58″, with a faint star nearer in the opposite quadrant. It may be that this is the Σ star, and not the faint pair measured.

$55^m\ 58^s$ **1063.** Σ 199. Without change.

1866.48	21°.0	35″.84	3*n*	Δ
1881.62	21.5	36.03	3*n*	β
1904.72	21.5	35.80	2*n*	β

[Ma (*F. S* **II**) . . . H (**IV**) . . . Δ (**II**) . . . Cin⁶ . . . β⁴ . . . β⁶ . . .]

55 58 **1064.** ε *Trianguli.* Σ 201. Very few measures of this pair. Apparently fixed. The large star has no sensible proper motion.

1868.96	118°.4	3″.99	5*n*	Δ
1877.81	116.8	4.10	1*n*	β
1897.77	115.9	4.14	3*n*	Doo

[Ma (*F. S.* **I**) . . . . H (**VII**) . . . . Δ (**II**) . . . . OΣ (**X**, p. 151) . . . . β² . . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

56 ± **1065.** H 2102. "The *p* of two stars 10 m." The other star referred to is DM (82°) 47.

56 7 **1066.** β 873. Discovered with the 18½-inch. Perhaps change in angle.

1891.51	27°.2	2″.12	3*n*	β
1902.77	24.3	2.13	3*n*	Doo

[β (**XIII**) . . . β³ . . . β (3114) (*Pub. L. O.* **II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) (*A. J.* 547) . . .]

(See p. 1059)

56 16 **1068.** H 647. "Large star *deep blood-red*—a very intense and remarkable color; small star *green.*" The colors are very marked with the 40-inch.

1900.74	35°.0	26″.58	3*n*	β⁵	8.8 . . . 9.3

56 27 **1069.** Σ 206. Relatively fixed.

1863.30	133°.6	31″.28	3*n*	Δ
1904.72	133.7	31.16	2*n*	β

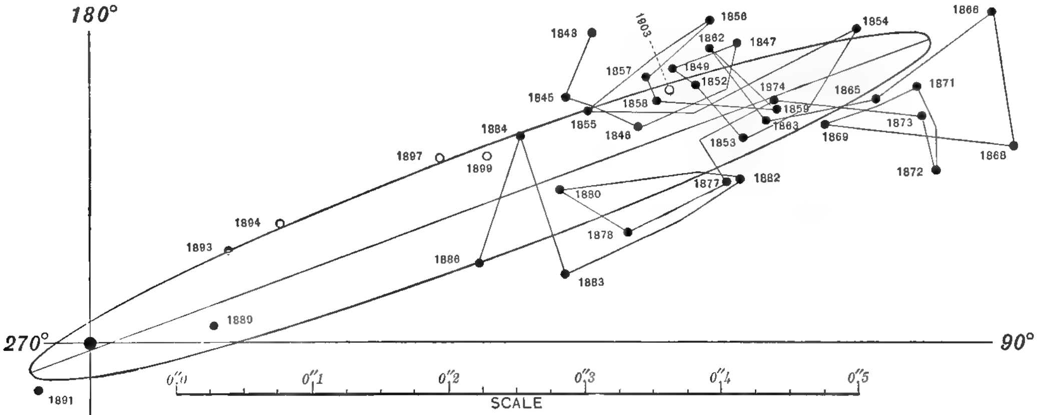
[Ma (*F. S.* **I**) . . . Ma (**X**) . . . Δ (**II**) . . . Cin⁶ . . . *A. G. Leipzig*, p. 206 . . . β⁶ . . .]

56 32 **1070.** γ *Andromedae.* OΣ 38. (AB = Σ 205 = ♅ III. 5 = Sh 26.) There is no change in the ♅ star since the measures of Struve and Bessel. The principal star has a proper motion of 0″.057 in 147°.8 (Auwers). Barnard has measured a 15 m star not previously seen, 244°.6 : 27″.94 (1898.70) 2*n*.

A and BC

1830.75	62°.3	10″.55	6*n*	Bes
1858.69	63.6	10.42	22*n*	OΣ
1863.81	62.9	10.39	7*n*	Δ
1878.68	64.3	10.66	2*n*	OΣ

For nearly forty years after the discovery of the close pair by Otto Struve in 1842, the measures failed to show any material change in either angle or distance. The observations are very discordant, and for many years it was impossible to say anything more than that an increase in the distance of perhaps one or two tenths of a second was probable, while change in the angle was at least doubtful so far as the measures were concerned. Some ten years ago it was evident that the distance was decreasing, and it finally came to be regarded as single in most telescopes. I found it very close with the 36-inch refractor at Mt. Hamilton, but made some measures of both angle and distance in 1889, and again in 1891 obtained three fairly satisfactory measures of the angle, the distance being estimated at not more than 0″.05. It was next measured by Barnard with the same instrument in 1893–95, showing a change in the interval of about 170° in the position-angle. The distance has continued to increase and it is now a comparatively easy pair.



Orbit of γ Andromedae BC

In *Monthly Notices*, LIV, 119, I have collected all the measures down to 1893, and given the first orbit attempted of this pair. Since that time two other orbits have been found, all showing about the same apparent ellipse. The periods are as follows:

1893	Burnham	54.8 years	*Mon. Not.* LIV, 119
1895	See	54.0	*Evolution of Stellar Systems*
1900	Hussey	55.0	*Pub. L. O.* V

The following selected measures will be sufficient to show the relative motion of the components from the time of discovery to the present:

B and C

1843.55	125°.5	0″.48	3*n*	OΣ
1849.69	114.9	0.47	4*n*	OΣ
1853.23	116.0	0.47	3*n*	Ma

1856.21	121°.7	0″.41	2*n*	Wn
1863.27	108.3	0.45±	8*n*	Δ
1866.21	110.0	0.70	3*n*	OΣ
1869.84	110.0	0.63	3*n*	OΣ
1873.17	105.4	0.63	5*n*	OΣ
1878.21	101.0	0.36	8*n*	Hl
1883.87	103.1	0.40	2*n*	Per
1889.51	98.2	0.09	1*n*	β
1891.72	312.6	0.05±	3*n*	β
1894.67	120.7	0.16	11*n*	Bar
1897.98	117.9	0.29	5*n*	A, Hu
1899.55	115.2	0.32	3*n*	A
1903.04	113.8	0.46	2*n*	Do

The diagram illustrating my orbit, already referred to, is reproduced from *Monthly Notices*, with the four later measures added. It will be seen that they are as well represented as could be desired. There will be but little change in either angle or distance for at least the next thirty years.

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Ma (324)...Se...Se^2...Se^3...Se (*Comp. Rend.* **XLVIII**, 375)...P^1...J^1...J^2...Da^1...Da^3...Da^4...H (**V**)...Wh ...Bp...Ra (**XXI, XXII, XXIX, XXXI, XXXIII, XXXV, XXXVI**)...Bes... Ba (**II, III**)....Wn (1738)....Ek (**I**)....Wn (**V**)....K (409)....Fl....*Wash. Obsns.* 1867, 1874, 1875, 1880, 1886...Gl. .Wr...Auwers (1393)...Romberg (*Mon. Not.* **XXIII**, 197)...Mh...Peters (1042)...Hd...WJ^2...Lu (**I, II, III**) ...Lu (1103)...Du...Bru...Bru^2...Sp (2132)...Sp (**II**)...WS...WS^2...Kn ...Pogson (*Brit. Assn. Rep.* 1858)...*Durham Obsns.* 1846–48...Sk...Sk^2 Sk^3...Sk^5...Hl (2147)...Hl (**I, II**)...Do (2196, 3680, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Je (2324)...Pk...Flm...Kustner (2584)...Franz (2590)...Per...Per (2684, 2748)...Pt...En (1673, 2678)..Lassell (858) (*Mon. Not.* **XIII**, 183)....T (2899)....Δ (1013, 1100, 1473, 1572, 1735)....Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Giacomelli (**I**)...Big...See (*Beob. Berlin*, No. 6, 1892)...OΣ (**X**, p. 152)...OΣ (**IX**)...β^1...β^3...β (*Sid. Mess.* **X**, 118)...β (2875, 2957, 3048, 3079, 3114)...β (*Pub. L. O.* **II**)...β (*Mon. Not.* **LIV**, 119) orbit...Glasenapp (**II, III**)...Cohn (3240)...Hagen (3258)...Brenner (3753) ...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)...See (*A. J.* 359, 378) ...See (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...Morgan (*A. J.* 439)...Barnard (*A. J.* 447)...Coleman (*Mem. R. A. S.* **LIII**)...Solá (3497, 3679)...Hu (*A. J.* 427) (*Pub. L. O.* **V**)....Gl (*Mon. Not.* **LXI**, 556)....*Annals Toulouse Obsy.* **III**...HΣ (**XII**)....A (3938) (*A. J.* 429) (*Bul. L. O.* No. 11)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...]

(See p. 1059)

56^m 36^s **1071.** **Kr 13.** Noted as double by Krueger in *A. G. Hels.*

1898.43	343°.7	3″.99	3*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

56 45 **1072.** **Σ 207.** Ma (XV) has a measure called Σ 207 which obviously belongs to some other pair, perhaps to Σ 208. Without change.

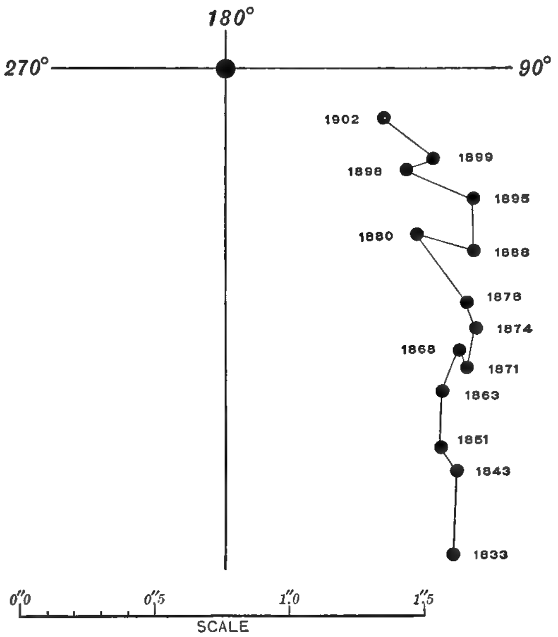
1866.20	184°.4	11″.53	3*n*	Δ
1901.87	185.8	11.92	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...β^5...]

56 50 **1074.** **10 *Arietis.* Σ 208.** Probably orbital motion, although the measures are well represented on the hypothesis of rectilinear motion. The system has a proper motion of 0″.163 in 90°.0 (Bossert). It will soon be a close pair, and if binary, the motion in angle should be rapid.

The following positions are shown on the diagram:

1833.05	25°.2	1″.98	4*n*	Σ
1843.69	29.9	1.71	4*n*	Ma
1851.76	29.6	1.60	1*n*	OΣ
1863.07	33.9	1.43	6*n*	Δ
1868.00	39.7	1.34	3*n*	Δ
1871.45	39.0	1.41	5*n*	Du
1874.28	44.0	1.32	3*n*	Δ
1878.05	46.0	1.23	2*n*	Hl
1880.05	49.2	0.93	4*n*	Sp
1888.97	53.9	1.13	3*n*	Hl
1895.87	62.3	1.03	1*n*	Lewis
1898.88	60.6	0.76	2*n*	A
1899.93	66.3	0.83	1*n*	A
1902.76	72.4	0.62	2*n*	Bowyer



10 Arietis. Σ 208

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H^1...Da^1...Da^2...Da^3...Se...Se^2 ...Se^3...En (1673, 2663)...Gl...OΣ (**IX**)...Flm...Δ (1100, 1473, 2192)...Δ (**I, II**)...Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Du...Sp (**II**) ....Sp (**II**, App)....Per....Per (2684)....Big....Hl (**I, II**)....Knorre (*Beob. Berlin*, No. 6, 1892)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIV**, 790)...Knorre (3300, 3518)...Ebell (3321) ...HΣ (**XII**)...A (3584, 3638)...]

1076. **Σ 209** *rej.* The only measure is the following: 57^m 7^s

1904.60	136°.2	39″.60	2*n*	β^6	9.0...9.1

1077. **H 2104.** Both R. A. and Decl. wrong in H. Examined and identified in DM. The other star is DM (52°) 501. 57 9

1901.74	167°.1	30″.19	2*n*	β^5	8.7...8.8

57^m 13^s **1078.** **Σ 204.** The motion, if any, is slow, but the components have a common proper motion of 0″.163 in 142°.4 (Schroeter).

1866.83	66°.0	1″.15	3*n*	Δ
1903.88	65.7	0.93	3*n*	β

[Ma (*F. S.* I) ... Ma (XI) ... H (V) ... Do (2989) (*Trans. R. I. Acad.* XXIX, Part 13) ... Se ... Δ (II) ... β^6 ...]

57 13 **1079.** **H 2107.** The only other observation is from H (VIII).

1835.9	0°.5	6″ ±	1*n*	H	9½ ... 10

7 22 **1080.** **H 3478.** The only measures are:

1846.97	138°.7	40″.16	1*n*	J^2	7½ ... 8½

57 39 **1083.** **61** *Ceti.* **H̨ V. 102.** In another observation in the same year, H̨ made the distance 34″.50. The principal star has some proper motion:

Bossert	0″.144 in 123°.7
A. G. Nico.	0.081 in 135.5

There is a more distant star not in H̨. Further measures are needed to show whether or not B is moving with A.

AB	1877.86	193°.3	42″.71	1*n*	β	
	1899.80	193.5	43.20	2*n*	Doo	7.1 ... 9.3
	1900.71	194.0	43.09	2*n*	β	6 ... 9
AC	1877.86	326.3	80.4	1*n*	β	
	1899.80	325.9	82.22	3*n*	Doo	... 11.9

[β^1 ... Doolittle (*Pub. Flower Obsy.* I) ... β^5 ...]

57 42 **1084.** **A. G. 29.** Noted as "oblong" in *A. G. Berlin.* Hu found it single with the 36-inch, 1898 (*Bul. L. O.* No. 44).

58 24: **1088.** **Σ 211** *rej.* From *Catalogus Novus.* H (V) could not find any such star in or near this place. I have also looked for it without success, unless it is a 7½ m star about 15′ *s* with a distant 9.5 m star in the field.

[H (V) ... β (*Mon. Not.* XXXIV, 370) ... β^5 ...]

59 6 **1091.** **β 516.** Discovered with the 18½-inch. Change is uncertain.

1886.83	287°.4	0″.84	3*n*	LM
1888.85	282.6	0.69	3*n*	Lv
1890.48	288.0	0.7 ±	4*n*	Sp
1898.70	289.4	0.90	3*n*	Cg
1900.65	290.0	0.83	3*n*	Doo

[β (X) ... β^1 ... LM ... Lv^1 ... Sp (III) ... Cogshall (*A. J.* 478) ... Doolittle (*Pub. Flower Obsy.* I) ...]

59 14 **1094.** **S 405.** (= σ 52 = OΣ (App) 22.) B is Groombridge 443. Relatively fixed.

1875.55	274°.7	55″.80	4*n*	Δ	6.1 ... 6.9
1903.88	274.8	55.68	2*n*	β	6.0 ... 6.2

[Δ (I) ... H (V) ... OΣ (X, p. 5) ... Δ (I) ... Franz (2649) ... β^6 ...]

1096. **A. G. 30.** Noted "duplex?" in *A. G. Leipzig.* Single at the Kirkwood Observatory, 1902. 59^m 19^s

1097. **Σ 212.** Apparently fixed. 59 30

1868.28	165°.5	1″.97	4*n*	Δ
1898.84	165.4	1.70	1*n*	Coleman

[Ma (*F. S.* II) ... Ma (XI) ... Se ... Δ (1118) ... Δ (II) ... Coleman (*Mem. R. A. S.* LIV) ...]

1098. **11** *Arietis.* **Ho 312.** The proper motion of the large star is 0″.020 in 199°.7 (*A. G. Berlin*). The only later measures are: 0 1

1895.39	332°.5	1″.43	2*n*	Ho

[Ho (3233, 3558) (*A. J.* 215) ...] (See p. 1059)

1102. **See 16.** Discovered at the Lowell Observatory. 0 25

1899.68	38°.6	0″.53	3*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

1103. **A. G. 31.** From *A. G. Leipzig.* 0 25

1902.80	151°.4	31″.5	2*n*	Miller

1105. **Σ 214.** Unchanged. 1 2

1866.16	189°.6	5″.11	3*n*	Δ
1904.72	190.5	5.20	2*n*	β

[Ma (*F. S.* I) ... Ma (XI) ... Se ... Δ (II) ... Cin^6 ... *A. G. Leipzig,* p. 206 ... β^6 ...]

1106. **Σ 213.** No change in the Struve companion. The 40-inch shows a third star not previously seen. 1 17

1866.92	322°.3	1″.95	3*n*	Δ
1901.25	321.8	1.88	2*n*	β

[Ma (*F. S.* I) ... Se ... Δ (II) ... Kustner (3821) ... β^5 ...]

1108. **Σ 215.** Without change since the measures of Struve. 1 43

1868.19	59°.5	19″.56	4*n*	Δ
1880.15	59.3	19.98	3*n*	β
1902.31	59.6	19.61	3*n*	β

[Ma (*F. S.* II) ... Δ (II) ... β^3 ... β^6 ...]

1109. **A. G. 32.** Double in *A. G. Lund.* Measures by β^6. There is a 12 m star nearer A, 328°.4 : 14″.3. 1 47

1110. **H 2114.** "A faint double star involved in a nebulous atmosphere." Looked for once, but not seen. 1 51

1111. **Espin 48.** Discovered by Espin (3774) (*Eng. Mech.* LXXIII, 31). No other measures. 2 11

$2^{m}\ 30^{s}$ **1112.** Arg. 7. "Duplex, Cl. IV" in Arg. Found (1876) and estimated as given. Since Part I was in type I have measured it:

1904.73	264°.6	18″.40	2*n*	β^{6}	8.3... 8.9

2 30: **1113.** **Σ 217** *rej.* The place given is from *Catalogus Novus*, where it is described, Cl. III and IV; mags. 8...8...9. Since Part I was in type, I have examined this region, and have but little doubt the stars referred to by Struve are DM (54°) 464, 465, and 466. The place of the first and brightest is:

$$\left.\begin{array}{l}\text{R. A.} = 2^{h}\ 0^{m}\ 17^{s} \\ \text{Decl.} = 54^{\circ}\ 39'.8\end{array}\right\}$$

Many small stars in the field:

AB	1904.74	123°.9	102″.85	1*n*	β^{6}	9.3...9.6
AC	1904.74	128.6	134.22	1*n*	β^{6}	...9.2
BC	1904.74	142.0	31.86	2*n*	β^{6}	

2 32 **1114.** **Σ 216.** Probably no material change.

1851.95	268°.8	0″.70	3*n*	OΣ
1867.36	266.6	0.6±	4*n*	Δ

[Ma (*F. S.* I)...Ma (**IX, XI**)...H (V)...Se...Se (*Comp. Rend.* **XLVIII**, 375)... Δ (II)...Big...OΣ (IX)...]

2 35 **1115.** **Σ 218.** (= **S** 407.) No evidence of change.

1867.64	248°.8	4″.69	4*n*	Δ
1904.70	248.6	4.63	2*n*	β

[Ma (*F. S.* I)... Ma (**X, XIII**)...Bp...Da^{3}...Ra (**XXV, XXVI**)...Wr...Ba (II) ... Se ... Se^{3} ... T (2898)... Lv^{1}... Δ (I, II) ... Giacomelli (I) ... Jones (*Proc. Haverford Coll. Obsy.* 1892)... Glasenapp (II)... Ho (3234)...*Annals Toulouse Obsy.* **III**...β^{6}...]

2 35 **1116.** 14 *Arietis.* ♅ VI. 69. (= **S** 406 = σ 56 = OΣ (App) 23.) The magnitudes of A and C from Δ. The angle of AB in ♅ belongs to AC.

AB	1879.94	36°.7	93″.13	2*n*	β
	1904.75	36.7	93.30	2*n*	β
AC	1875.18	278.5	106.18	4*n*	Δ
	1879.94	278.4	105.68	2*n*	β
	1892.36	278.5	105.91	4*n*	Franz
	1904.75	278.3	105.68	2*n*	β

Rechenberg (3482) gives proper motions:

A = 0″.044 in 111°.5
B = 0.313 in 89.3

[Δ (I)...β^{3}...Glasenapp (III)...Franz (3464)...β^{6}...]

3 3 **1120.** **Σ 221.** (= ♅ III. 68 = **S** 408.) Distant star from Wn (1738); not in Σ. No change in AB.

AB	1865.18	145°.0	8″.25	3*n*	Δ
	1904.57	145.0	8.38	2*n*	β
AC	1904.57	228.8	63.40	2*n*	β

[Ma (*F. S.* I)...Ma (**XI, XIII**)...H (V)...Bp...Ba (II, III)...Wr...Wn (1738) ...Wn (V)...Da^{3}...Flm...Sk...Se...Δ (II)...Big...Do (3930)...β^{6}...]

$3^{m}\ 6^{s}$ **1121.** **H 1109.** "A nebula precedes it 90″ dist. Pos. est. by diagram." The nebula is Dreyer 828. The only measure of the double star is:

1902.17	172°.7	26″.30	2*n*	β^{6}	9.7...10.1

3 8 **1122.** 5 *Persei.* **β 874.** Discovered with the 18½-inch. Krueger gives the annual proper motion of this star 0″.060 in the direction of 274°.8. This would change only the distance of the companion. If the small star was fixed, the distance should have decreased 1″ from 1880 to 1898. The measures show no material change in the position of B, so that it is certain, if this value of the proper motion is substantially correct, that the two stars are moving together, and probably make a physical system.

The following are all the later measures:

1891.51	274°.1	5″.40	3*n*	β
1898.57	272.0	5.34	2*n*	β
1904.76	271.3	5.28	2*n*	β

[β (**XIII**)...β^{3}...β (*Observatory*, **III**, 582)...β (3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* I)...β^{6}...]

3 11 **1123.** **Σ 219.** Without change since 1831.

1866.50	183°.1	11″.53	3*n*	Δ
1901.38	183.3	11.54	3*n*	β

[Ma (*F. S.* I)...Ma (**XIII**)...Wr...Δ (II)...β^{5}...]

3 33 **1124.** **H 2116.** "Three nebulae in the field." The nebulae are Nos. 833, 835, and 838 of Dreyer's Catalogue. The only measure of H 2116 is:

1903.61	160°.5	28″.13	2*n*	β^{6}	9.1...12.4

3 36 **1125.** 59 *Andromedae.* **Σ 222.** (= ♅ IV. 129 = **Sh** 27.) Fixed. The principal star has a proper motion of 0″.029 in 262°.2 (Auwers).

1866.38	35°.5	16″.52	3*n*	Δ
1890.11	35.2	16.46	1*n*	Maw
1899.00	33.4	16.50	2*n*	Coleman
1904.79	35.0	16.55	2*n*	β

[Ma (*F. S.* I)...Ra (**XXII, XXIII**)...Δ (1185)...Δ (I, II)...Cin^{6}...Maw (I)... Giacomelli (I)....Glasenapp (II)....*Annals Toulouse Obsy.* **III**....Coleman (*Mem. R. A. S.* **LIV**)...β^{6}...]

4 ± **1126.** **H 2110.** "The *p* star of an equilateral triangle." The principal star is DM (84°) 38, and the other stars of the triangle Nos. 39 and 41.

4 22 **1129.** **Σ 224.** (= ♅ N. 105.) Unchanged since Struve. (See No. 1146.)

1866.86	243°.3	4″.93	4*n*	Δ
1892.82	243.0	5.20	2*n*	Gla
1904.73	243.2	5.18	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H^{1}...H (IV)... Bp...Ba (II)...Ferr...Du...Gl... Se...Se^{3}....Δ (1204)....Δ (I, II)....Glasenapp (II, III)....*A. G. Leipzig*, p. 206....*Annals Toulouse Obsy.* **III**)....Coleman (*Mem. R. A. S.* **LIV**).... β^{6}...]

$4^m\ 31^s$ **1131. OΣ (App) 24.** The change is due to the proper motion of one or both stars. The movement of A from meridian positions is given:

Stumpe	0″337	in 126°0
Porter	0.319	in 126.3
A. G. Hels.	0.347	in 124.3

Porter gives the motion of the smaller star, 0″115 in 90°0. The following are all the measures since Dembowski:

1882.83	332°0	57″52	4*n*	Franz
1889.00	331.9	59.26	2*n*	Hl
1892.21	331.9	59.98	2*n*	Eng
1897.44	331.8	61.42	5*n*	Doo
1903.64	331.7	62.76	3*n*	β

The measures of ⅃ and β, give for the movement of A, assuming B to be stationary:

0″251 in 118°5

[Δ (I)....Hl (II)....Franz (2649)....Engelhardt (III)....Doolittle (*Pub. Flower Obsy.* I)...β6...]

4 41 **1135. A. G. 33.** Measures from *A. G. Leipzig.*

1902.93	320°6	40″16	3*n*	Cogshall

5 5 **1136. Σ 225.** Unchanged. The principal star is given a proper motion of 0″034 in 270° (*A. G. Harvard*).

1866.98	79°0	5″85	3*n*	Δ
1904.79	78.6	5.88	2*n*	β

[Ma (*F. S.* I)...Ma (XII, XIII)...H (V) .Bl (V). .Gl...Δ (II)...β6...]

5 25 **1137.** *ι Trianguli.* **Σ 227.** (= H II. 34 = Sh 28.) Σ in 1831 made the angle 77°9, from which motion was expected, but this has not been confirmed by the later measures. In fact the change, if any, is in the opposite direction, but some of the measures are discordant for so easy a pair. Not ι in B. A. C., but only 6 *Trianguli.* The components are probably relatively fixed, but have a common proper motion of 0″101 in 237°0 (Auwers). The measures are far more numerous than there is any occasion for.

1869.69	77°7	3″65	5*n*	Δ
1877.06	75.2	3.58	4*n*	Sp
1877.08	76.7	3.77	4*n*	Hl
1885.04	77.1	3.76	3*n*	Hl
1897.73	75.4	3.91	2*n*	Hu

[Ma (*F. S.* I)...Ma (IX, X, XI, XIII, XV)...P1...H1...Da1...Da2...Ba (II)...Wr...Se...Se3...Ma (304, 324)...Wh...Ek (I, III)...Bes...Auwers (1393)...Lu (1103)...Lu (I, II, III)...Se (1017)...K (409)...En (1673)...Peters (1042)....Ra (XXII)....Hd....Gl....WS....Ferr....Nobile (*Acc. Sci. Nap.*, Jan. 1875)....Do (2196, 2989, 3680, 3798) (*Trans. R. I. Acad.* XXIX, Part 13)...Pk...Flm...Sk...Sk2...Sk4...Sk5...Sp (II)...Du...Kustner (2584)...Franz (2590)...Per...Per (2684)...T (2866)...Hayne (3051)...Hl (*Wash. Obsns.* 1885). .Hl (I, II)...⅃ (*Mem. Accad. Sci.*)...Δ (1013)...Δ (I, II). ..Giacomelli (I)....Big....Jones (*Proc. Haverford Coll. Obsy.*, 1892)...Glasenapp. (II, III)...Maw (II)...Cohn (3240)...Knorre (3300, 3518)...Hussey (*A. J.* 427)...Coleman (*Mem. R. A. S.* LIII)...*Annals Toulouse Obsy.* III...]

5 27 **1139. Σ 226.** No relative change since Struve, but the stars have a common proper motion. The movement of the principal star from meridian observations is:

Porter	0″164	in 135°3
A. G. Berlin	0.187	in 126.0

The later measures are:

1868.49	248°4	2″27	4*n*	Δ
1901.27	245.6	2.15	4*n*	β

[Ma (*F. S.* I)...Ma (XI)...Se...Δ (II)...β5...]

1140. Ho 497. The only later measures are: $5^m\ 33^s$

1900.71	65°0	0″56	3*n*	Lewis

[Ho (3557)...Lewis (*Mon. Not.* LX, 495; LXI, 486; LXIII, 403)...]
(See p. 1059)

1141. 6 *Persei.* **σ 60.** The large star has a proper motion of 0″374 in 117°0 (Bossert). 5 34

1881.14	73°2	139″56	1*n*	OΣ	
1903.67	70.8	132.34	3*n*	β	...9.2

The measures of OΣ and β give for the proper motion of A:

0″368 in 113°8

[OΣ (X, p. 59)...β6...]

1142. Hd 56. "Near 66 *Ceti.*" Not identified by Miller in 1903 at the Kirkwood Observatory. 6

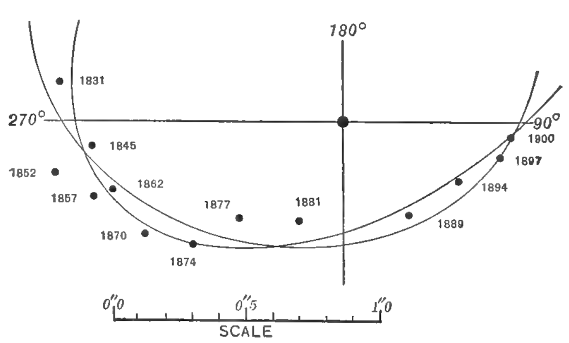
1143. Σ 223. Rather difficult pair, but there seems to be no motion. 6 9

1846.98	51°9	0″83	2*n*	OΣ
1878.66	50.7	0.78	1*n*	β
1889.79	44.9	0.90	1*n*	HΣ

[Ma (*F. S.* I)...H (V)...OΣ (IX)...Do (2989) (*Trans. R. I. Acad.* XXIX, Part 13)...Δ (II)...β1...Big...HΣ (XII)...]

1144. Σ 228. *Andromedae* **259.** This binary system has a proper motion of 0″112 in 225°3 (*Greenwich 10-Year Catalogue*). Two orbits have been found: 6 21

1889	Gore	88.73 yrs.	*Mon. Not.* L, 81
1898	Doberck	123.1	*A. N.* 3525



Σ 228

It will be seen from the accompanying diagram that the apparent ellipse is still uncertain, but it is possible that in a few years the described arc will be sufficient to give a good approximate period. The two apparent orbits shown on the diagram give periods which differ by more than one hundred years, the smaller being not less than 250 years.

1831.46	262°.1	1″.08	5*n*	Σ
1845.18	275.6	0.96	3*n*	Ma
1852.19	280.2	1.11	1*n*	Ma
1857.62	286.8	0.99	3*n*	Se
1862.96	286.5	0.91	4*n*	Δ
1870.18	299.6	0.86	1*n*	OΣ
1874.90	309.4	0.71	2*n*	Δ
1877.12	313.0	0.54	4*n*	Hl
1881.96	336.2	0.41	2*n*	Hl
1889.48	34.1	0.43	6*n*	Hl
1894.67	62.4	0.49	4*n*	HΣ
1897.87	77.2	0.60	6*n*	Hu, A
1900.45	84.7	0.63	4*n*	A
1903.99	90.8	0.65	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...H (**V**)...Se...Δ (1100, 1473, 2192)...Δ (**I, II**)...Hl (*Wash. Obsns.* 1881)...Hl (**I, II**)...Hl (*A. J.* 265)...WS...Gl...Du...Flm...Sk...Sk^{2}...Sk^{3}...Sk^{4}...Sk^{5}...En (2663)...Big...OΣ (**IX**)...T (2991, 3185).. .Gore (*Mon. Not.* **L**, 81)....Big (*Bul. Ast.* **XII**, 299)....Everett (*Mon. Not.* **LVI**, 464)...Do (2242, 3525, 3680)...Com (*Pub. Washburn Obsy.* **X**)....Hu (*A. J.* 427)....A (*A. J.* 429)(*Bul. L. O.* No. 11)....Greenwich Obsy. (*Mon. Not.* **LVI**, 360; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...HΣ (**XII**)...Biesbroeck...]

(See p. 1059)

6^{m} 21^{s} **1145.** **β 1275.** Discovered with the 40-inch (*Pub. Yerkes Obsy.* I). No other measures.

6 24: **1146.** **H N. 105.** "Place very precarious." I am positive from a careful examination that this is identical with Σ 224. (See No. 1129.)

6 27 **1147.** **See 17.** Discovered at the Lowell Observatory.

1898.93	357°.3	8″.47	3*n*	Cg	7.8...11.3

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

6 28 **1148.** **Σ 230.** Unchanged.

1865.50	257°.7	23″.78	3*n*	Δ
1880.67	258.4	24.28	5*n*	β
1903.87	258.2	23.49	2*n*	Es

[Ma (*F. S.* **II**)...Δ (**II**)...β^{2}...β^{4}...Espin (*Mon. Not.* **LXIV**, 676)...]

6 39 **1149.** **66 *Ceti.* Σ 231.** (= **H IV. 25 = Sh 29.**) Probably a physical pair, the components having the same proper motion of 0″.346 in the direction of 99°.6 (Porter), but there is very little relative change.

1864.91	229°.1	15″.60	5*n*	Δ
1877.79	230.6	15.86	4*n*	Cin
1895.41	232.2	15.98	2*n*	Collins
1901.93	232.2	15.52	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Wn (1738)...Wr...Ba (**II**)...H (**VIII**)...Hd...J^{2}...Ek (**I**)...Bp ..Ra (**XXI**)...Δ (*Mem. Accad. Sci.*)...Δ (1013)...Δ (**I, II**)...WS...OΣ (**IX**)...Se^{1}...Se (*Comp. Rend.* **XLVIII**, 375)...Nobile (*Accad. Sci. Nap.* Jan. 1875)...Do (2196, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Goldney (2257)...Flm...Gl...Sk^{2}...En (2663)...Cin^{4}...Cin^{6}...Wilson (Cin^{10})...Giacomelli (**I**)...β^{2}...Scott (*Brit. Ast. Ass'n* **V**, 75) Collins (*A. J.* 378)...Chofardet (3450)...Solá (3563)...*Annals Toulouse Obsy* **III**...Lewis and Bryant (*Mon. Not.* **LXII**, 384)...]

6^{m} 50^{s} **1150.** **Σ 229.** Probably fixed.

1869.54	358°.1	2″.53	4*n*	Δ
1879.83	357.5	2.40	2*n*	β
1904.79	359.9	2.53	2*n*	β

[Ma (*F. S.* **I**)...H (**VII**)...Se...Δ (**II**)...OΣ (**IX**)(**X**, p. 152)...β^{3}...β^{6}...]

7 6 **1152.** **A 205.** Discovered at the Lick Observatory by Aitken (3784) (*Bul. L. O.* No. 16).

7 39 **1158.** **H VI. 110.** The place in H has an error of about 5^{m} in R. A., and 5′ in Decl. It is described as "somewhere in the neighborhood of *o Ceti.*" I have identified it as given in Part I. The components are SD (3°) 340 and 341. No other measures since 1783.

1903.65	135°.2	81″.85	3*n*	β^{6}	7.9... 9.1

7 43 **1159.** ***Trianguli* 28. Σ 232.** (= **Sh 30.**) Relatively fixed.

1869.08	66°.8	6″.63	4*n*	Δ
1885.07	66.7	6.78	2*n*	Hl
1902.94	66.5	6.60	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Se...Se^{3}...Wr...Ra (**XXIII**)...Fl...Nobile (*Accad. Sci. Nap.* Jan. 1875)...Da^{2}...Bp...Ba (**II**)...Δ (1118)...Δ (**I, II**) OΣ (**IX**)...Du...Flm...Sk^{2}...Sk^{4}...Sk^{5}...Je (2449)...Giacomelli (**I**)...Hl (*Wash. Obsns.* 1885)...Hl (**II**)...Hayn (3051)...Big...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...Searle (*A. J.* 299)...Chofardet (3450)...*Annals Toulouse Obsy.* **III**...Do (3798, 3930)...]

(See p. 1059)

8 29 **1163.** **OΣ (App) 25.** The only later measures are:

1883.24	204°.3	102″.96	5*n*	Franz

Δ (**I**)...Franz (2649)...]

(See p. 1059)

8 34 **1164.** **Σ 234.** Slow motion in angle, but the distance has diminished, and in 1904.84 I found it single, or too close to measure under fair conditions with the 40-inch.

1846.98	235°.6	0″.83	2*n*	OΣ
1863.45	231.5	0.75	3*n*	Δ
1871.20	220.0	0.63	5*n*	Δ

[Ma (*F. S.* **II**)...Ma (**XI, XIII, XV**)...H (**IV**)...Se...OΣ (**IX**)...Δ (1473, 2192) Δ (**II**)...Flm...Do (2303)...Sk^{2}...Gl...β^{6}...]

8 36: **1165.** **H III. 42.** There is no pair in this place. From an examination of all the stars in the vicinity, I am satisfied that this is identical with Σ 246 (See No. 1195). H calls the components *reddish* and *bluish*, with distance of 6″ or 7″. This description agrees with Σ 246.

8 53 **1166.** **Σ 235.** Without material change.

1866.83	225°.4	1″.81	3*n*	Δ	8.6... 8.7
1881.57	46.8	1.51	3*n*	β	
1899.89	225.4	2.13	4*n*	Doo	8.4... 8.5

[Ma (*F. S.* **I**)...Ma (**XIII**)...Se...Δ (**II**)...β^{4}...Com (**VI**)...Doolittle (***Pub.*** *Flower Obsy.* I)...]

8m 54s **1167. Hd 57.** The place of this in the *Harvard Annals* is R A. = $2^h 8^m.8$; Decl. = 23°40′ (for 1875), with the description as given in Part I. Hussey found this pair about 11′ *n*, and his approximate place is used here. It is not in the DM.

1901.85	94°.9	7″.77	1*n*	Hu	9.5... 9.5
1903.79	93.6	7.73	2*n*	β	10.5...10.5

[Hu (*Bul. L. O.* No. 44)...β6...]

9 16 **1169. Σ 236.** Change doubtful, but later observers make the distance more than Σ.

1847.32	258°.2	1″.07	2*n*	OΣ
1867.75	255.6	1.23	3*n*	Δ
1870.18	257.9	1.21	1*n*	OΣ
1902.17	259.1	1.11	1*n*	Lewis

[Ma (*F. S.* I)...H (**V**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Δ (**II**)...Sk3...OΣ (**IX**)...Lewis (*Mon. Not.* **LXIII**, 403)...]

9 17 **1170. Σ 237.** Without change.

1865.77	238°.7	14″.35	3*n*	Δ
1880.21	238.5	14.42	3*n*	β
1904.72	238.5	14.42	2*n*	β

[Ma (*F. S.* I)...Ma (**X**)...Δ (**II**)...Cin6...β3...*Annals Toulouse Obsy.* **III**...β6...]

9 18 **1171. β 786.** Discovered with the 15½-inch at the Washburn Observatory. There seems to be no material change.

1888.06	349°.7	5″.30	3*n*	Com
1898.60	351.1	5.20	2*n*	β
1902.82	350.3	5.16	1*n*	Hu

[β (**XII**)...β4...Updegraff, Lamb, and Comstock (*Pub. Washburn Obsy.* **V**, **VI**)...Doolittle (*Pub. Flower Obsy.* I)...Hu (*Bul. L. O.* No. 44)...]

9 26 **1172. Σ 233.** Probably fixed, unless change in distance.

1867.03	277°.7	2″.45	3*n*	Δ
1904.77	276.6	2.26	2*n*	β

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Δ (**II**)...Cin6...β6...]

9 36 **1174.** *δ Trianguli.* **σ 66.** I could see nothing with the 6-inch, but subsequently a very faint star 13m was noted with the 18½-inch. This is too faint to make it probable that it was seen by Σ. The only measures are those with the 40-inch, given in Part I. The bright star has a large proper motion of 1″.144 in the direction of 101°.2 (Auwers).

9 39 **1175.** *χ Persei.* **β 1170.** (AD = **S** 409.) The close pair was discovered with the 36-inch. It is a difficult pair even with that aperture. A is the principal star in the great cluster in *Perseus.* A and D make the double star, South 409. All the measures of this are given below.

The principal star has a small proper motion:

Auwers	0″.068 in 261°.5
Battermann	0.034 in 245.7

B and C

1890.74	313°.3	0″.27	3*n*	β
1899.65	297.4	0.32	1*n*	A

A and BC

1890.74	353°.3	70″.39	3*n*	β
1898.60	353.6	70.22	2*n*	β

A and D (= S 409)

1824.99	136°.5	124″.53	1*n*	S	
1879.54	136.3	122.66	1*n*	β	...9.0
1898.60	136.2	123.12	2*n*	β	...8.6

[β (**XVII**)...β (3047)...β3...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (3638)...]

1177. A 206. (AC = **Σ 238.**) The principal star of Σ 238 was found by Aitken in 1901 to be a close pair. No later measures. 9m 56s

The Struve companion appears to be fixed.

1866.30	356°.7	10″.67	3*n*	Δ
1901.97	356.9	10.83	1*n*	A

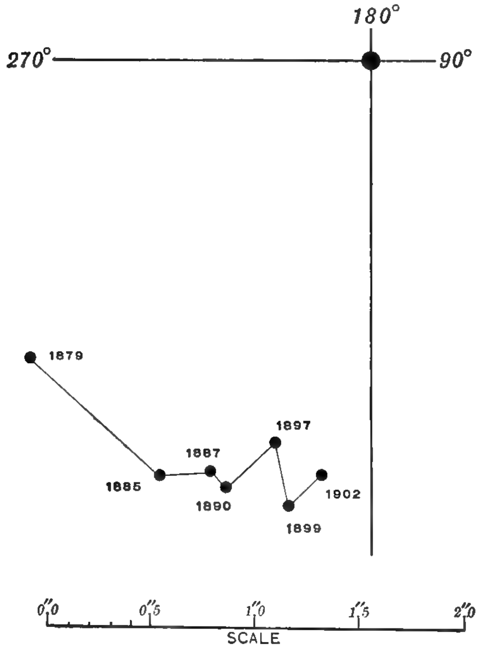
[Ma (*F. S.* **I**)...H (**IV**)...Wr...Δ (**II**)...Cin6...A (3784)(*Bul. L. O.* No. 16)...]

1178. OΣ 39 *rej.* Rejected as single in the Poulkowa Catalogue of 1850, and so found by Δ in 1865. Retained here because of a single observation of Ma, 16°.6 : 0″.25 (1844.36). Hussey found it perfectly round with the 36-inch under favorable conditions in 1899. It is probably not double. 9 59

[Ma (**XI, XIII**)...Δ (**I**, p. 227)...Hu (*Pub. L. O.* **V**)...]

1179. Hastings. Lalande 4219. Discovered by Dr. C. S. Hastings. The principal star has considerable proper motion: 10 3

Stumpe	0″.221 in 192°.6
Porter	0.222 in 180.0
Wilson	0.242 in 186.7



Hastings. Lalande 4219

The change in B does not correspond to the proper motion of A, but it is impossible to say from the measures to this time whether it is binary, or a pair of the 61 *Cygni* type.

1879.92	311°8	2″22	2*n*	Hl
1885.04	333.4	2.29	3*n*	Hl
1887.06	338.9	2.18	4*n*	Hl
1890.95	341.4	2.21	3*n*	β
1897.04	346.0	1.94	2*n*	A
1899.73	349.5	2.22	5*n*	Doo
1902.90	353.1	2.05	3*n*	Scott

[Hl (*Wash. Obsns.* 1885).... Hl (**II**).... Lv^1.... Lv (*Sid. Mess.* **VI**, 80)(*Proc. Haverford Coll. Obsy.* 1891)....LM....T (2991)....Tebbutt (*Mon. Not.* **LI**, 332; **LII**, 386)....β (3048)(*Pub. L. O.* **II**).... Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 368)(*Mon. Not.* **LIX**, 427; **LXIV**, 52)...A (3465)...Doolittle (*Pub. Flower Obsy.* **I**)...Do (3798)...Kustner (3821)...]

(See p. 1059)

$10^m 20^s$ **1181.** **Σ 242** *rej.* The large star has a proper motion of 0″300 in 102°7 (Porter), and this appears to correspond to the change in B. The only measures are:

1877.94	228°5	50″54	1*n*	β	
1896.98	231.8	53.27	2*n*	A	
1897.75	233.1	54.26	4*n*	Doo	7.0...10.0
1902.82	234.2	54.35	2*n*	β	6.5... 9.8

[β^1...A (3465)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

10 27 **1183.** **Σ 239.** (= ♅ **IV. 40 = Sh 31.**) Without change.

1865.57	210°4	14″12	3*n*	Δ
1888.95	210.8	13.93	5*n*	Giac
1904.79	210.7	13.93	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Da^1...Se^1... Ra (**XXII**)...Δ (1204)...Δ (**I, II**)... Giacomelli (**I**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^6...]

10 28 **1184.** *Arietis* **65.** **Σ 240.** Without change.

1866.09	50°2	4″65	3*n*	Δ
1883.89	49.2	4.85	3*n*	Per
1898.13	50.4	4.77	1*n*	Maw

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)... Bp... Se... Se^3... Ba (**II**)...Wr... Da^3...Ra (**XXV**)...Δ (1118)...Δ (**I, II**)...Du...Sk^3...Per... Per (2684)...Giacomelli (**I**)...Maw (**III**)...Do (3930)...]

10 34 **1185.** **H 3491.** Fixed.

1877.83	285°3	6″65	2*n*	Cin
1897.75	285.9	6.87	1*n*	See

[Cin^3...Cin^4...See (3495)...]

10 35 **1186.** **Tucker.** Found to be double by Tucker with the Lick Observatory meridian circle. Measures by Aitken (*Bul. L. O.* No. 11).

10 38 **1187.** **H 1114.** "Chief star in cluster of *Perseus.*" The only measure is:

1902.90	337°9	27″77	2*n*	β^6	7.5...12.6

1188. **DM (56°) 530.** Measured by β^6 in identifying H 1114 (No. 1187). There is a remarkable similarity in the two pairs in angle, distance, and magnitudes. $10^m 48^s$

1189. **Σ 244.** Fixed. 10 49

1866.09	289°4	4″40	3*n*	Δ
1883.89	288.1	4.50	3*n*	Per
1904.91	288.2	4.36	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...Per...Per (2684)...Δ (**II**)...β^6...]

1190. **A 207.** Discovered at Mt. Hamilton by Aitken (3784) (*Bul. L. O.* No. 16). 10 50

1191. **A. G. 34.** Noted as double in *A. G. Lund.* No companion could be seen with the 40-inch on two nights in 1902. 10 51

1193. **OΣ (App) 26.** The later measures show no motion. 11 2

1881.67	199°6	63″17	3*n*	β
1883.01	199.6	63.31	4*n*	Franz

[Δ (**I**)...Franz (2649)...β^4...Espin (*Mon. Not.* **LXIV**, 678)...]

1194. **Σ 245.** (= **S 410.**) Apparently unchanged. 11 13

1867.75	292°1	10″79	4*n*	Δ
1904.79	292.1	10.82	2*n*	β

[Ma (*F. S.* **I**)....Wr.... Ra (**XXIII, XXIV**)....Δ (1204)....Δ (**I, II**)... *Annals Toulouse Obsy.* **III**...β^6...]

1195. **Σ 246.** (= ♅ **III. 42.**) Fixed. (See No. 1165.) 11 28

1867.78	122°7	10″11	4*n*	Δ
1904.79	122.0	10.20	2*n*	β

[Ma (*F. S.* **I**)...H^2...Wr...Δ (**II**)...Cin^6...β^6...]

1196. **A. G. 35.** Suspected double in *A. G. Leipzig.* Miller and Cogshall found it single in 1902 at the Kirkwood Observatory. 11 33

1198. 10 *Trianguli.* **H 1115.** Herschel says, "disagrees too much in distance with Sh 31 [No. 1183] to be the same star, nor can it be 10 *Trianguli.*" With considerable attention, I succeeded in seeing the companion in 1874 with the 6-inch. It *is* 10 *Trianguli,* which has the same place as that given by H. The only measures are: 11 59

1900.74	205°3	57″09	2*n*	β^5	6...12

1199. **Σ 247** *rej.* The only measures are: 12 7

1879.66	32°2	7″37	1*n*	Cin^6	10.0...10.5
1901.79	31.7	7.54	2*n*	β^5	9.0... 9.0

$12^m\ 10^s$ **1200. Σ 241.** No material change.

1867.98	283°7	20″08	4*n*	Δ
1904.77	283.6	20.08	2*n*	β

[Ma (*F. S.* **II**) ... Ma (**XIII**) ... H (**V**) ... Gl ... Δ (**II**) ... β^6 ...]

12 12 **1201. O. Stone 5.** (= **β** 737 *rej.*) Discovered at the Cincinnati Observatory, and independently later at Mt. Hamilton.

1877.87	201°5	3″04	2*n*	Cin
1901.92	203.2	....	2*n*	Do

[β^2 ... Cin^4 ... Wilson (Cin^{10}) ... Do (3798) ...]

12 26 **1202. β 437.** Discovered with the 18½-inch. The components appear to be relatively fixed.

1891.96	33°4	7″19	3*n*	β
1898.73	31.7	7.12	1*n*	β
1904.91	32.9	7.12	1*n*	β

[β (**VIII**) ... β (*Am. Jour. Sci.* July 1877) ... β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... Cin^6 ... β^6 ...]

12 46 **1205. β 1171.** Discovered with the 36-inch. In the great *Perseus* cluster; the *s* star of two about 1′ apart. It is 9.2 m in DM. No other measures.

[β (**XVII**) ... β (3047) (*Pub. L. O.* **II**) ...]

13 10 **1206. H 327.** "South of a very faint nebula." This nebula appears to be Dreyer 823. The other observations of H 327 are:

1830+	329°5	20″ ±	1*n*	H (V)	
1902.92	316.4	23.90	2*n*	β^6	8.7 ... 10.2

13 17 **1209.** *o Ceti.* (AC = **H VI. 1 = Sh 362.**) The celebrated variable *Mira.* The faint star between this and the H companion was added with the 18½-inch. The change in C is due to the proper motion of A, which is given:

Auwers	0″231	in	185°9
Bossert	0.232	in	187.4

A and B

1890.77	88°1	73″94	2*n*	β
1904.68	85.9	72.86	2*n*	β

A and C

1864.53	84°0	115″67	5*n*	OΣ
1878.92	82.4	116.24	3*n*	β
1888.06	81.3	116.27	2*n*	Eng
1904.68	79.5	116.95	2*n*	β

[Hahn (*Ast. Jahr.* 1804) ... P^1 ... Flm ... Engelhardt (**II**) ... OΣ (**X**) ... β^1 ... β^3 ... β (3048) ... β (*Pub. L. O.* **II**) ... Sk^4 ... β^6 ...]

13 31 **1212. Σ 248.** Probably some change in the angle.

1847.91	162°7	1″58	1*n*	Ma
1869.99	155.3	1.76	4*n*	Δ
1879.61	155.1	1.93	1*n*	Cin
1894.50	153.8	1.65	3*n*	HΣ
1904.91	147.6	1.26	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... Δ (**II**) ... Cin^6 ... HΣ (**XII**) ... β^6 ...]

1214. Σ 250. Probably unchanged. $13^m\ 57^s$

1870.13	135°4	3″05	5*n*	Δ
1880.15	136.5	2.87	3*n*	β
1904.90	135.3	2.91	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... Δ (**II**) ... Cin^5 ... β^3 ... β^6 ...]

1215. Σ 249. Apparently fixed. 13 58

1868.85	192°3	2″06	4*n*	Δ
1894.50	191.0	2.20	3*n*	HΣ
1904.79	192.5	2.40	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII, XV**) ... Se ... Gl ... OΣ (**IX**) ... Flm ... Δ (**II**) ... Sk^3 ... En (2663) ... Collins (*A. J.* 378) ... HΣ (**XII**) ... β^6 ...]

1216. A. G. 36. Double in *A. G. Lund.* Measures by β^6. 13 58

1217. 9 *Persei.* **β 875.** Discovered with the 18½-inch. The proper motion, according to Krueger, is 0″023 in the direction of 241°8. The measures show no relative motion, and it is probably only an optical pair. 14 0

1891.51	161°0	11″64	3*n*	β
1898.70	161.7	11.40	2*n*	β
1904.91	159.5	11.74	1*n*	β

[β (**XIII**) ... β^3 ... β (*Ast. Reg.* **XVIII**, 286) ... β (3114) (*Pub. L. O.* **II**) ... Hu (*Bul. L. O.* No. 44) ... β^6 ...]

(See p. 1060

1218. H 2125. The only measures are from the Kirkwood Observatory. 14 18

1904.68	90°1	25″99	3*n*	Miller

1219. Σ 251. Without change. 14 21

1870.31	264°5	2″25	4*n*	Δ
1879.61	265.2	2.24	1*n*	Cin
1904.88	264.2	2.50	1*n*	β

[Ma (*F. S.* **I**) ... Se ... Δ (**II**) ... Cin^6 ... β^6 ...]

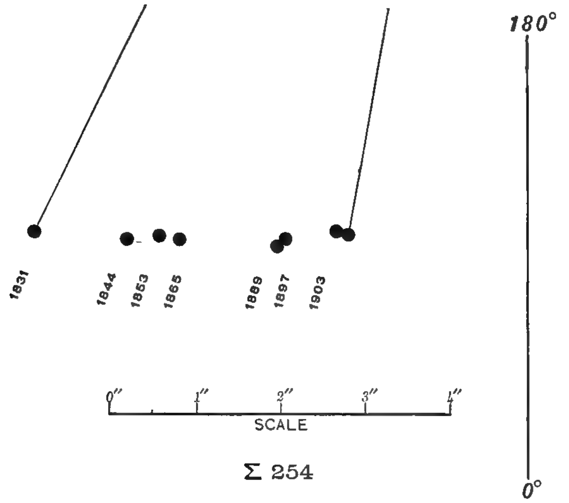
1221. OΣ 40. Very little, if any, relative motion. 14 25

1867.57	53°4	obl.	3*n*	Δ
1878.91	57.5	0″62	1*n*	β
1883.90	51.1	0.53	3*n*	Per
1898.62	52.3	0.59	4*n*	Hu

[Ma (**XIII**) ... Δ (1806) ... Δ (**I**) ... Sk^3 ... Per ... Per (2684) ... HΣ (**XII**) ... En (2742) ... β^3 ... Hu (*Pub. L. O.* **V**) ...]

1223. A. G. 37. Double in *A. G. Leiden.* Measures by β^6. 14 35

14m 48s **1224.** **Σ 254.** The change is due to proper motion. If it is the brighter component, as it probably is, it has an annual motion of 0″.051 in the direction of 270°. The minimum distance will come with a position-angle of 360°.



1831.75	334°.1	13″.33	2*n*	Σ
1844.04	338.6	12.94	1*n*	Ma
1853.90	340.0	12.80	1*n*	Ma
1865.08	341.2	12.74	4*n*	Δ
1889.28	346.3	12.47	3*n*	HΣ
1897.59	346.6	12.52	5*n*	Doo
1903.05	349.2	12.15	2*n*	Do
1903.90	349.9	12.14	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI, XIII, XV**) . . . Gl . . . WS . . . Sk² . . . Flm . . . Δ (1572) . . . Δ (**II**) . . . Doolittle (*Pub. Flower Obsy.* I) . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . . Kustner (3821) . . . Do (3930) . . . β⁶ . . .]

14 59 **1226.** **β 8.** Discovered with the 6-inch. Distance may be increasing. The following are all the later measures:

1880.92	204°.3	0″.90	1*n*	β
1888.87	204.8	1.07	5*n*	Lv
1898.78	207.2	1.37	3*n*	Cg
1900.65	201.9	1.26	3*n*	Doo

[β (I) . . . β (*Mon. Not.* **XXXIII**, 351) . . . β³ . . . Δ (I) . . . Lv¹ . . . Lv (*Sid. Mess.* **VIII**, 77) . . . Cogshall (*A. J.* 478) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

15 20 **1227.** **Σ 252.** There is no evidence of change.

1868.22	43°.4	3″.22	4*n*	Δ
1879.74	43.9	2.97	1*n*	Do
1904.73	42.8	2.81	3*n*	Miller

[Ma (*F. S.* I) . . . Ma (**XI**) . . . H (**IV**) . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Δ (**II**) . . . J. A. Miller (   ) . . .]

15 50 **1230.** **Σ 256.** Probably unchanged for both companions.

A and B

1868.45	196°.9	20″.80	4*n*	Δ
1881.65	196.4	21.07	3*n*	β
1904.79	196.2	21.17	2*n*	β

A and C

1867.06	44°.0	36″.56	3*n*	Δ
1881.65	44.0	36.71	3*n*	β
1904.79	44.2	36.38	2*n*	β

[Ma (*F. S.* **II**) . . . Δ (**II**) . . . β⁴ . . . β⁶ . . .]

1231. **Σ 255** *rej.* From *Catalogus Novus.* The only measures are: 15m 53s

1902.24	1°.2	6″.96	2*n*	β⁶	9.5 . . . 9.6

1232. **H 2129.** Measured by Cogshall at the Kirkwood Observatory: 15 58

1904.75	156°.0	16″.73	3*n*	Cg	9.7 . . . 12.5

1234. **H 2134.** No pair of this description in or near this place. It is certainly identical with H 2140, which is about 4m *f.* (See No. 1266.) 16 0

[β⁵ . . .]

1235. **Σ 257.** Probably binary, but the motion is slow. 16 41

1846.98	172°.3	0″.61	2*n*	OΣ
1857.48	183.3	0.40	2*n*	Se
1869.53	182.5	0.46	8*n*	Δ
1870.18	190.8	0.52	1*n*	OΣ
1900.19	248.5	0.37	1*n*	Lewis
1904.01	235.1	0.31	3*n*	A

[Ma (*F. S.* I) . . . . Ma (**IX, X, XIII, XV**) . . . . H (**IV**) . . . . Se . . . . Se (*Comp. Rend.* **XLVIII**, 375) . . . Flm . . . Du . . . Δ (1473) . . . Δ (**II**) . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**. Part 13) . . . Sk . . . OΣ (**IX**) . . . Lewis (*Mon. Not.* **LXI**, 486) . . . Biesbroeck . . . A (   ) . . .]

1237. **H 3498.** "Triple? Excessively difficult." I could not see any companion with the 36-inch (1890.84). 16 43

[β (3048) (*Pub. L. O.* **II**) . . .]

1238. **Cordoba.** "Double" in Cordoba Zones. These stars are O. Arg. S. 1514 and 1515. 16 43

1239. **A. G. 38.** From *A. G. Leipzig.* Measured at Kirkwood Observatory: 16 45

1902.88	260°.9	34″.33	3*n*	Miller

1240. **β 876.** (ACD = Σ 258.) The duplicity of the principal star of Σ 258 was detected with the 18½-inch. The following are all the later measures. Evidently the Σ components are relatively fixed. 16 46

A and B

1891.87	231°.1	1″.04	2*n*	β
1895.87	233.6	1.00	1*n*	L
1898.74	237.3	1.17	2*n*	Hu

C and D (= Σ 258)

1845.44	25°6	5″97	1*n*	Ma
1867.00	28.7	5.89	3*n*	Δ
1880.13	28.7	6.01	4*n*	β
1891.87	28.1	6.09	2*n*	β
1895.87	33.7	6.14	1*n*	Lewis
1898.75	28.2	6.21	3*n*	Hu
1899.07	29.0	5.88	1*n*	Lewis

A and C

1867.99	145°0	70″28	3*n*	Δ
1879.49	145.4	70.31	2*n*	β
1891.87	146.2	70.06	2*n*	β
1898.74	146.3	70.74	2*n*	Hu

[β (**XIII**)....β^3....β (3114)(*Pub. L. O.* **II**).... Lewis (*Mon. Not.* **LVI**, 359; **LX**, 495)...Hu (   )...Ma (*F. S.* **I**)...Δ (**II**)...]

16^m 49^s **1241.** **Hn** 7. Probably unchanged.

1889.05	185°8	2″27	5*n*	Com
1902.89	187.1	1.92	3*n*	β

[β^4...Com (**VI**)...Com (*Sid. Mess.* **IX**, 78)...β^6...]

16 52 **1242.** **H** 1116. R. A. in H is 1^m too large, but correctly given in H (V), 124°1:6″±:8-9...11 (1830+). The larger star is 8.7 m in DM. Measured at the Kirkwood Observatory:

1904.71	305°5	5″38	4*n*	Cogshall	8.3...12.2

17 4 **1245.** **H** 649. "A very minute object, but bears a little illumination." The only later measure is:

1901.80	127°5	9″10	1*n*	β^5	12.5...13

17 31 **1248.** **Σ** 259 *rej.* From *Mensurae Micrometricae*, p. xxxiv. In DM 9 m.

1830+	16°3	15″±	1*n*	H (V)	10...13
1904.65	18.1	13.51	2*n*	β^6	9...11

17 55 **1250.** **Σ** 261. Probably fixed.

1866.21	249°6	2″77	3*n*	Δ
1904.71	250.3	2.78	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Se...Cin^6...Δ (**II**)...Collins (*A. J.* 378) ...*A. G. Leipzig*, p. 206...*Annals Toulouse Obsy.* **III**...β^6...]

18 0 **1252.** **β** 738. Discovered with the 6-inch at Mt. Hamilton in 1879. The magnitude in Lacaille is 6½, and 7¼ in Gould. Porter gives the proper motion 0″165 in the direction of 217°3. It is obvious that this is common to both components. The relative motion is slow.

1891.80	174°3	0″55	3*n*	β
1899.00	184.1	0.79	1*n*	Bd

[β (**XI**)...β^2...β (3114)(*Pub. L. O.* **I**, **II**)...Boothroyd (*A. J.* 478)...]

(See p. 1060)

18 10 **1255.** **Σ** 260. No apparent change.

1866.95	348°5	6″46	3*n*	Δ
1903.85	346.9	6.44	2*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...β^6...]

1256. **Σ** 265. No sensible change. 18^m 24^s

1865.80	135°5	11″97	3*n*	Δ
1904.72	135.2	11.89	2*n*	Cogshall

[Ma (*F. S.* **I**) .... Wn (1738) .... OΣ (**IX**)...Δ (**II**) .... *Annals Toulouse Obsy.* **III**...]

1259. **Σ** 266. Fixed. 18 48

1858.89	268°2	7″34	2*n*	OΣ
1865.81	268.5	7.23	3*n*	Δ
1877.88	267.1	7.67	3*n*	Cin

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**VIII**)....Se....OΣ (**IX**)....Δ (**II**)....Cin^4.... *Annals Toulouse Obsy.* **III**....]

1260. *Ceti* 374. **β** 517. Discovered with the 18½-inch. 18 54
There seems to be no material change. The principal star is Lalande 4486.

A and B

1878.99	247°4	10″84	3*n*	β
1898.69	248.6	11.13	2*n*	β
1898.76	248.8	11.23	2*n*	A
1899.89	248.7	11.24	5*n*	Doo

A and C

1898.69	289°1	55″54	2*n*	β
1898.76	289.0	56.29	2*n*	A
1899.89	289.4	56.34	5*n*	Doo

[β (**X**)....β^1....β^3....β (*Pub. Y. O.* **I**)....A (3584)....Boothroyd (*A. J.* 478).... Doolittle (*Pub. Flower Obsy.* **I**)....]

1261. **A. G.** 39. From *A. G. Leipzig.* Measured at 18 55
Kirkwood Observatory:

1902.76	355°4	21″13	2*n*	Miller

1262. ι *Cassiopeiae.* **Σ** 262. (= **H** I. 34 = **H** III. 4 = 19 10
H N. 65 = **S** 411.) Slow retrograde motion in the close pair. The proper motion is small, 0″028 in 270° (Auwers), but it evidently belongs to the three stars as there is no change in the position of C.

A and B

1829.66	276°7	1″86	5*n*	Σ
1840.91	271.7	2.24	2*n*	Da
1845.35	267.7	2.09	7*n*	OΣ
1861.59	266.1	1.95	3*n*	OΣ
1866.55	265.7	1.94	6*n*	Δ
1879.08	262.4	2.14	3*n*	Hl
1889.94	256.6	2.23	3*n*	Hl
1897.17	250.3	1.75	3*n*	Coleman
1900.21	251.6	2.16	2*n*	Sk
1904.90	253.7	2.18	2*n*	β

A and C

1829.85	107°3	7″63	5*n*	Σ
1851.12	110.1	7.79	9*n*	OΣ
1865.51	107.8	7.69	6*n*	Δ
1884.51	110.7	7.44	6*n*	Hl
1904.90	111.2	7.46	2*n*	β

[Ma (*F. S.* I)...Ma (**IX, X, XI, XIII, XV**)...Se...Da^{1}...Da^{2}...Da^{3}...P^{1}...Ba (**I, II**)...*Δ* (1013, 1109, 1256, 1473)...*Δ* (**I, II**)...*Δ* (*Mem. Accad. Sci.*)...H (**IV**)...Newcomb (*Wash. Obsns.* 1867)...Hd...En (1518, 1673, 2663)...Sk^{2}...Sk^{3}...Sk^{5}...Ra (**XXVIII, XXXV, XLVII**)...Bp...OΣ (**IX**)...Wr...WS...Gl...Flm...Du...Bru...Pl...Pk...Nobile (*Accad. Sci.* Nap., Jan. 1875)...Do (2196, 2316 3680)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Je (2324, 2449)...Bl (**V**)...Kustner (2584)...Pt...T (2866)...Hl (**I, II**)...Big....Collins (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1891–92)....Glasenapp (**II, III**)...Knorre (3300, 3518)...Espin (*Brit. Ast. Ass'n* **III**, 227)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...β^{6}...]

19^{m} 33^{s} **1263.** **β** 739. Discovered with the 6-inch on Mt. Hamilton in 1879. There is but little, if any, change.

1891.77	266°0	1″45	3*n*	β
1897.04	261.4	1.69	2*n*	A

[β (**XI**)...β^{2}...β (3114)(*Pub. L. O.* **I, II**)...A (3465)...]

19 55 **1264.** **Ho** 216. The later measures are:

1894.81	333°3	1″01	2*n*	Ho

[Ho (2977, 3558)...]

(See p. 1060)

19 54 **1265.** **Σ** 267 *rej.* These stars are DM (53°) 529 and 530 and the only measure is:

1901.72	24°7	92″88	1*n*	β^{6}	8.5... 8.6

The *A. G.* positions give, 24°2 : 92″96 (1877.9).

H (IV) has a pair which he calls Σ 267 *rej.*; it is not that, but a pair of small stars in the field closely following.

1830+	149°2	20″±	1*n*	H	11 ...11
1901.74	147.9	18.28	2*n*	β^{6}	9.7... 9.8

19 59 **1266.** **H** 2140. (= **H** 2134.) In H, "R. A. conjectural." Identified and measured:

1901.72	263°2	10″60	2*n*	β^{5}	8.5...10.0

There is an error of 4^{m} in H's R. A. of H 2134 (See No. 1234).

20 12 **1267.** **H** 3500. "Duplex Cl. II" in O. Arg. S.

1877.83	164°8	15″42	2*n*	Cin
1904.73	164.9	15.51	3*n*	Miller

[Cin^{3}...Cin^{4}...]

20 18 **1268.** **H** III. 80. (= **S** 412.) H's place slightly in error. The assigned magnitudes differ greatly; S, 8...12; H (V), 7...10–11; J^{2}, 5½...9; O. Arg. S. 6m. Naked-eye star in Heis, 6m, but not in Lalande. Probably fixed.

1846.88	293°3	11″84	1*n*	J	
1877.13	293.2	12.80	4*n*	Cin	
1903.91	295.3	11.97	2*n*	β	6.2... 9.2

[WJ...J^{2}...H (**V**)...Hd...Cin^{3}...Cin^{4}...β^{6}...]

20 19 **1269.** **OΣ** (**App**) 27. The only later measures are:

1900.71	31°8	73″73	2*n*	β	7.5... 8.5

[*Δ* (**II**)...β^{5}...]

20^{m} 40^{s} **1271.** **Σ** 263–264. No evidence of motion. A^{1} and B^{1} make Σ 264.

AB	1867.39	103°1	14″79	3*n*	*Δ*
	1904.71	103.1	14.31	3*n*	Miller
A^{1}B^{1}	1867.39	225.9	16.52	3*n*	*Δ*
	1904.72	225.9	16.68	4*n*	Miller
AA^{1}	1867.39	263.0	39.03	3*n*	*Δ*
	1904.71	262.8	38.63	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XIII**)...Gl...Pl...*Δ* (**II**)...J. A. Miller ( )...]

20 42 **1272.** **Doo** 5. Discovered by Doolittle (*Pub. Flower Obsy.* I). Not in DM, but nearly midway between DM (61°) 415 and 422.

20 54 **1274.** **H** 2136, "Fine." In DM 8.5m.

1900.93	34°7	5″02	3*n*	Espin

[Espin (*Mon. Not.* **LXII**, 531)...]

20 58 **1275.** **Σ** 268. Probably unchanged. The larger star has a proper motion of 0″018 in 131°1 (Battermann).

1868.83	129°6	2″73	5*n*	*Δ*
1901.88	131.0	2.66	2*n*	Es

[H^{1}...H^{2}...Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Ra (**XXIII, XXIX**)...*Δ* (1204)...*Δ* (**I, II**)...Se...Espin (*Mon. Not.* **LXII**, 528)...]

21 27 **1277.** **β** 1172. Discovered with the 36-inch; in the borders of the cluster in *Perseus.* The later measures are:

1899.65	232°8	1″60	1*n*	A
1899.79	238.2	1.68	2*n*	Barnard
1900.82	241.0	1.71	2*n*	Doo

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Doolittle (*A. J.* 547)...A (3638)...]

21 46 **1278.** **Σ** 269. (= **H** **I.** 21 = **OΣ** 41 *rej.*) There may be a slight advance in the angle, but the results are not harmonious. This is erroneously called P II. 93 by Σ, and 13 *Trianguli* by several observers. Observed once by Ma as OΣ 41.

1846.39	341°1	1″67	4*n*	OΣ
1859.94	344.7	1.78	2*n*	Se
1867.28	342.7	1.82	6*n*	*Δ*
1898.78	343.4	1.77	3*n*	Hu
1903.11	345.2	1.81	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...H (**IV**)...Bp...Ba (**II**)...Wr...OΣ (**IX**)...Da^{3}...Se...*Δ* (1118)...*Δ* (**I, II**)...Flm...Pl...Gl...HΣ (**XII**)...Sk^{2}...**Hu** (*Pub. L. O.* **V**)...Do (3930)...]

22 13 **1279.** **H** 2141. "Points *sp* a star 8m." The 8m star is probably DM (44°) 512.

22 21 **1280.** **Σ** 270. The principal star is given a proper motion of 0″138 in 127°6 (*A. G. Harvard*). If this is correct, the companion has the same motion, as there has been no relative change.

1866.96	302°7	21″30	3*n*	*Δ*
1902.78	303.5	21.15	3*n*	β

I have measured a third star, first noticed with the 6-inch. There is also a 12.5 m star, 268°2 : 42″5.

AC	1902.79	338°8	35″45	2*n*	β	...10.6

[Ma (*F. S.* I)...Ra (**XXIII**)...OΣ (**IX**)...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 528)... β^{6}...]

22m 38s **1281.** **H 2139.** "Either a close double star, or an elongated planetary nebula; but the stars are growing suddenly so very ill-defined that I cannot positively decide, yet I have little doubt of its being a double star. Position and distance estimated by diagram."

Upon examination (1876) I found a pair of small stars in this place, 9...9–10, with distance of 2½″, and angle of 130° ±. There is a third star fainter, perhaps 20″ distant. Certainly no closer pair. It was subsequently examined in 1890 with the 36-inch with the same result. Recently measured with the 40-inch, and identified in DM, where the principal star is 7.5 m.

AB	1902.77	119°3	3″33	2*n*	β	8.2... 8.2
AC	1902.77	18.2	19.44	2*n*	β	...10.8

[β^{6}...Espin (3717)...]

23 11 **1285.** *Ceti* 389. **β 518.** Discovered with the 18½-inch. A naked-eye star in *Cetus*. It has no appreciable proper motion. B. A. C. 764. Unchanged.

1891.75	138°7	1″70	3*n*	β
1901.78	141.8	1.62	7*n*	Doo

[β (**X**)....β^{1}....β (3114) (*Pub. L. O.* **II**).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...]

23 14 **1286.** **β 1314.** Discovered with the 40-inch in 1902 (β^{6}).

23 38 **1288.** **β 519.** Discovered with the 18½-inch. Change is uncertain.

1886.69	55°2	1″17	3*n*	LM
1891.86	54.4	0.69	2*n*	β
1898.79	59.2	0.86	3*n*	A
1898.91	57.5	0.93	3*n*	Bd
1900.95	47.4	0.80	2*n*	Doo
1901.10	37.0	0.55	1*n*	Lewis
1902.71	62.1	0.81	2*n*	A

[β (**X**)...β^{1}...β^{3}...β (3114) (*Pub. L. O.* **II**)...Cin⁴...LM...A (3584)...Boothroyd (*A. J.* 478)... Doolittle (*A. J.* 547)...A (   )... Lewis (*Mon. Not.* **LXII**, 384)...]

23 38 **1289.** **Σ 271.** (= **H** N. 12.) There is no relative change, but the stars have a common proper motion:

A. G. Berlin	0″106 in 140°1
Kustner	0.097 in 146.7

1865.92	181°5	12″07	3*n*	Δ
1879.92	181.4	12.25	2*n*	β
1904.77	181.3	12.25	2*n*	β

[Ma (*F. S.* I)...Δ (**II**)...Cin⁶...β^{3}...β^{6}...]

1290. **H 2142.** "Beautifully triple." Three nearly equal stars, forming a very perfect equilateral triangle. 23m 53s

AB	1902.78	308°5	8″00	2*n*	β	9.1...9.3
AC	1902.78	354.7	8.45	2*n*	β	...9.3

[Espin (3717)...β^{6}...]

1291. **β 304.** Discovered with the 6-inch. The distance is increasing, but the change in a pair of this kind would be almost necessarily due to proper motion. The measures indicate an annual movement of about 0″08 in the direction of 102°. 24 5

1891.99	282°8	19″09	3*n*	β
1898.18	282.4	19.30	2*n*	β

[β (**VI**)...β^{3}...β (2062, 3114) (*Pub. L. O.* **II**)...]

1293. **A. G. 40.** Noted as double in *A. G. Berlin.* 24 10

[Hu (*Bul. L. O.* No. 44)...Cogshall (*A. J.* 546)...]

1295. **Σ 272.** Probably fixed. 24 23

1869.02	39°3	1″82	4*n*	Δ
1903.88	38.9	2.07	1*n*	Es

[Ma (*F. S.* **I**)... OΣ (**IX**)... Se ... Δ (1118, 1185) (**I, II**)...Espin (*Mon. Not.* **LXIV**, 676)...]

1297. **H 2143.** The companion is DM (56°) 657; magnitudes, 7.8...9.5. I found them so in 1876. This pair is noted as new by Oeltzen (*A. N.* 887). The only measures are: 24 53

1904.64	19°8	23″40	2*n*	β^{6}	8.5...9.1

Many stars in the field, and one of them nearer A than the one measured.

1299. **OΣ 42.** There is no very certain change in the angle, but the distance is less. It has been frequently noted as single, but this is probably explained by the closeness of the pair. This star has a proper motion of 0″017 in 229°7 (Battermann). 25 6

1843.21	110°4	0″3 ±	1*n*	Ma
1851.76	115.4	0.33	3*n*	Ma
1883.84	101.5	0.25	5*n*	En
1899.40	122.1	0.11	3*n*	Hu

[Ma (**XI, XIII**)....OΣ (**IX**)....Δ (1806) (**I**, p. 227)....β^{2}....En (2678)....Lewis (*Mon. Not.* **LXI**, 486; **LXIII**, 403)...Hu (*Pub. L. O.* **V**)...]

(See p. 1060)

1300. **H 3504.** "An elegant double star." The only complete measure is: 25 10

1877°82	270°4	6″89	1*n*	Cin	8.5...9.0

[Cin⁴...Do (3378)...]

25^m 20^s **1301.** **Σ 274.** (= **S** 413.) Probably unchanged.

1865.13	218°6	13″59	3*n*	Δ
1880.24	219.3	13.26	3*n*	β
1904.71	219.7	13.50	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII, XV**)... Se^1... Ra (**XXV**)... Δ (1204)(**I, II**) ... Giacomelli (**I**)... β^3... Glasenapp (**II, III**)... *Annals Toulouse Obsy.* **III**... β^6...]

25 23 **1303.** **Σ 273.** (= **♅ N.** 106 = **S** 514.) Fixed.

1866.35	359°6	6″79	4*n*	Δ
1904.69	359.7	6.99	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII, XV**)... H^1... Se... Gl... Du... Per... Per (2684)... Δ (**II**)... β^6...]

25 46 **1305.** **Howe 6.** Discovered at the Cincinnati Observatory by Howe in 1876.

1886.77	206°4	2″53	6*n*	LM	9.0...9.1

[Δ (**I**)... Lv^1... Cin^4... LM... Wilson (Cin^{10})...]

25 51 **1306.** **A. G. 41.** Double in *A. G. Lund.* Measures by β^6.

26 9 **1308.** **H 652.** "Elegant; both ruddy." Unchanged.

1879.63	315°2	4″47	3*n*	β	9.0...9.4
1903.66	314.6	4.34	2*n*	β	9.1...9.3

[β^3... Lv^1... *A. G. Leipzig*, p. 246... β^6...]

26 20 **1309.** **Σ 276.** Possibly a slight advance in the angle, but measures discordant.

1857.07	256°5	2″04	2*n*	Se
1866.40	254.5	2.24	3*n*	Δ
1897.96	261.2	2.18	3*n*	Coleman
1904.71	258.6	2.01	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XII, XV**)... Se... WS... Gl... Cin^6... Δ (**II**)... Coleman (*Mem. R. A. S.* **LIV**)... β^6...]

26 26 **1310.** **H 653.** The only later observation is:

1904.90	42°1	22″91	2*n*	β^6	7.5...11.2

26 48 **1313.** **A. G. 42.** Double in *A. G. Lund.* Measures by β^6.

27 53 **1316.** **Hn 63.** From *Pub. Washburn Obsy.* II. Measures by Com (VI).

27 57 **1317.** **Σ 277.** No change since Struve.

1866.58	136°5	3″23	3*n*	Δ
1904.76	138.3	3.42	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XIII**)... Bl (**V**)... Δ (**II**)... β^6...]

1319. **Σ 280.** Probably without material change. 28^m 8^s

1867.34	346°0	3″38	4*n*	Δ
1877.84	346.1	3.36	2*n*	Cin
1886.73	346.3	3.73	4*n*	LM
1901.88	347.2	3.45	4*n*	Do

[Ma (*F. S.* **I**).... Ma (**XI, XII, XIII, XV**).... H (**V**).... Se.... Se^3.... Ra (**XXV, XXVIII, XXIX**)... Hd... Δ (1118)... Δ (**I, II**)... WS... Gl... Sp (**II**)... LM... Cin^4... Cin^6... Wilson (Cin^{10})... Giacomelli (**I**)... Jones (*Proc. Haverford Coll. Obsy.* 1892)... Scott (*Brit. Ast. Ass'n* **V**, 75) (*Mon. Not.* **LIX**, 427)... *Annals Toulouse Obsy.* **III**... Do (3798)...]

1320. **Σ 279.** (= **♅ N.** 47.) No measures in ♅. Fixed, or very little change. 28 15

1868.21	73°0	17″37	4*n*	Δ
1888.71	70.3	17.73	2*n*	β
1903.85	71.7	17.40	2*n*	β

[Ma (*F. S.* **II**)... β^3... Δ (**II**)... β (2957)... β (*Pub. L. O.* **II**)... β^6...]

1321. **Σ 278.** The results are so contradictory that nothing regarding change can be inferred. Late measures are wanting. This star has a proper motion of 0″042 in 270° (Schroeter). 28 23

1857.94	67°7	0″4	2*n*	Se
1859.28	71.1	0.62	4*n*	OΣ
1870.40	76.4	0.56	5*n*	Δ

[H (**IV, V**)... Ma (*F. S.* **I**)... Ma (**XV**)... Se... Se (*Comp. Rend.* **XLVIII**, 375)... Hd... OΣ (**IX**)... Flm... Δ (2194)... Δ (**II**)...]

(See p. 1060)

1322. **H 3506.** Herschel's estimated distance of 5″ is shown to be too small in H^3, where it is given 11″15. The components are fixed. 28 35

1858.03	242°8	10″70	2*n*	J
1879.79	242.4	10.65	1*n*	Cin
1900.77	244.4	10.54	1*n*	Solá

[H^3... J^2... J^3... Pk... Cin^3... Cin^4... Cin^6... Wilson (Cin^{10})... Johnson (*Mon. Not.* **XLVIII**, 257)... Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 368) (*Mon. Not.* **LIX**, 427)... See (3495)... Solá (3679)... Do (3798)...]

1324. **Hd Zones.** Marked "double" in the *Harvard Zones.* Looked for twice; no star in this place brighter than 9m, and the 6-inch failed to show any companion, close or otherwise. The 40-inch in 1900 revealed nothing more (β^5). 29 0

1326. **Arg. 8.** "Duplex, Cl. I" in *O. Arg.* No close pair found with the 6-inch under favorable conditions (1875). The 40-inch in 1900 showed nothing nearer than a 10m star about 53″ distant (β^5). 29 29

1328. *ν Ceti.* **Σ 281.** Without change. The stars have a common proper motion of 0″081 in 249°8 (Auwers). 29 33

1866.49	84°4	7″75	4*n*	Δ
1903.96	82.3	7.62	3*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**VII**)... OΣ (**IX**)... Du... Se... Se^3... Pk... β^2... Δ (**II**)... T (2898)... Coleman (*Mem. R. A. S.* **LIV**)... β^6...]

$29^m\ 37^s$ **1329.** **OΣ (App) 28.** Unchanged.

1881.65	147°.0	67″.84	3*n*	β

[Δ (I)…β4…Franz (2694)…]

29 40 **1331.** **Kr 14.** Double in *A. G. Hels.*

1898.47	288°.7	11″.62	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**)…Doolittle (*Pub. Flower Obsy.* **I**)…]

30 4 **1332.** 30 *Arietis.* **Σ 5, App. I.** (= **H̥ V. 49 = Sh 32 = OΣ (App) 29.**) The companion is P II^h. 128. The proper motion of these stars is given in *A. G. Berlin.*

A = 0″.119 in 93°.4
B = 0.116 in 82.6

The components are relatively fixed beyond all question, and hence the movement of the stars in space must be at exactly the same rate.

1868.23	273°.4	38″.57	4*n*	Δ
1878.95	273.4	38.66	4*n*	Je
1891.35	273.3	38.39	4*n*	Franz
1904.77	274.0	38.37	2*n*	β

[Ra (**XXIII, XXV**)…Schur (2255)…Je (2329)…Rechenberg (3482)…Maiebckato (*Obsns.* 1892)…Δ (**II**)…OΣ (**X**)…Franz (3464)…β6…]

30 30 **1335.** **H 3511.** By another observation H gives, 97°.3: 20″ ± :8…9½. Unchanged.

1877.91	96°.9	15″.48	2*n*	Cin	7.2…9.0
1895.89	96.8	14.68	1*n*	Scott	
1903.83	97.0	14.65	2*n*	β	7.7…9.0

[Cin5…Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LXIV**, 52)…β6…]

30 49 **1338.** **β 520.** Discovered with the 6-inch. Change uncertain.

1888.94	199°.8	0″.89	1*n*	LM
1898.81	201.7	0.92	4*n*	A
1898.82	207.0	0.88	2*n*	Bd
1899.89	200.3	0.94	5*n*	Doo

[β (**X**)…β1…LM…A (3584)…Boothroyd (*A. J.* 478)…Doolittle (*Pub. Flower Obsy.* **I**)…]

30 53 **1340.** *Persei* 58. **β 305.** Discovered with the 6-inch. The measures by Δ are credited by him to β 304, which is in the same vicinity. Lalande 4830.

1888.71	205°.5	20″.77	7.0…10.7	2*n*	β

[β (**VI**)…Δ (**I**)…β (2602, 2957) (*Pub. L. O.* **II**)…]

(See p. 1060)

31 8 **1341.** **Σ 282.** Fixed; but the stars have a common proper motion.

A = 0″.191 in 90° } Schroeter
B = 0.193 in 129.3 }

1869.12	294°.1	6″.92	4*n*	Δ
1879.78	292.4	7.24	2*n*	Cin

[Ma (*F. S.* **I**)…H (**IV**)…Wr…Du…Δ (**II**)…Cin6…]

1342. **Σ 283.** Change doubtful. $31^m\ 18^s$

1867.45	207°.5	1″.79	3*n*	Δ
1904.77	207.0	1.82	2*n*	β

The 40-inch shows a 13.5 m star not previously observed:

1904.77	14°.6	18″.34	2*n*	β

[Ma (*F. S.* **I**)…Ma (**XI, XII, XIII**)…Se…Δ (**II**)…β6…]

1344. **Cordoba.** Double in *Cordoba Zones.* The only measures are: 31 27

1904.76	50°.4	4″.01	1*n*	β6	9.0…9.0

1345. **Σ 284.** No material change. 31 32

1867.45	195°.9	5″.44	3*n*	Δ
1904.77	194.3	5.85	2*n*	β

[Ma (*F. S.* **I**)…Ma (**XI, XIII**)…Δ (**II**)…β6…]

1346. **Σ 285.** The angle is slowly decreasing, the distance remaining unchanged. 31 41

1857.89	175°.4	1″.91	2*n*	Se
1868.26	173.8	1.86	4*n*	Δ
1883.88	171.5	1.84	4*n*	Per
1887.95	171.8	1.84	3*n*	Hl
1898.97	168.1	1.63	1*n*	Coleman

[Ma (*F. S.* **I**)…Ma (**XI, XIII**)…H2…H (**VII**)…OΣ (**IX**)…Per…Per (2684)…Δ (1118, 1185)…Δ (**I, II**)…Se…Hl (**II**)…Giacomelli (**I**)…Solá (3679)…HΣ (**XII**)…Coleman (*Mem. R. A. S.* **LIV**)…]

1347. **H 2152.** The principal star has a proper motion of 0″.026 in 103°.2 (Battermann). The only measure is: 31 53

1903.63	58°.8	42″.41	2*n*	β6	7.5…13.2

1350. **A. G. 43.** From *A. G. Leipzig.* Measured at the Kirkwood Observatory: 32 20

1902.93	58°.1	2″.06	2*n*	Miller

(See No. 12904)

1352. **Σ 288.** (= **H̥ III. 79.**) Probably fixed. 32 22

1783.65	224°.8	10″.80	1*n*	H̥
1867.24	215.7	11.67	4*n*	Δ
1897.44	215.1	11.86	5*n*	Doo

[Ma (*F. S.* **I**)…Ma (**XI**)…H (**V, VIII**)…Flm…Cin4…Cin5…Δ (**II**)…Doolittle (*Pub. Flower Obsy.* **I**)…]

1353. **Σ 287.** (= **H̥ N. 107.**) No measures by H̥. Apparently unchanged. 32 25

1866.72	74°.0	6″.41	4*n*	Δ
1903.65	72.6	6.61	3*n*	β

[Ma (*F. S.* **I**)…Ma (**XI**)…Se…Δ (**II**)…Cin6…β6…]

32^m 32^s **1354.** **β 1315.** C is DM (13°) 423. (β^6.)

32 34 **1355.** **Σ 286.** Probably unchanged, but early measures discordant.

1868.29	254°8	2″95	4*n*	Δ
1879.80	256.1	3.00	2*n*	β
1904.59	256.4	2.94	2*n*	β

[Ma (*F. S.* I)...H (VII)...Ma (X, XIII)...Δ (II)...β^3...β^6...]

32 35 **1356.** **OΣ (App) 30.** No change since Dembowski.

1903.96	214°1	68″75	2*n*	β

[Δ (II)...β^2...β^6...]
(See p. 1060)

32 52 **1357.** **Ho 315.** No other measures.

[Ho (3233)(*A. J.* 215)...]

33 13 **1359.** **Σ 290.** Fixed. The 40-inch shows a 14 m star, 138°: 16″8.

1866.12	220°8	10″17	3*n*	Δ
1904.00	219.6	10.21	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β^1...β^6...]

33 29 **1361.** **H 2154.** "In M 34." The only later observation is:

1903.85	140°8	9″66	1*n*	β^6	8.8...11.2

33 38 **1362.** **H 3518.** "Elegant triple star." The only measures are:

AB	1901.25	15°3	13″58	2*n*	β^5	8.6...10.5
AC	1901.25	243.1	14.19	2*n*	β^5	...10.6

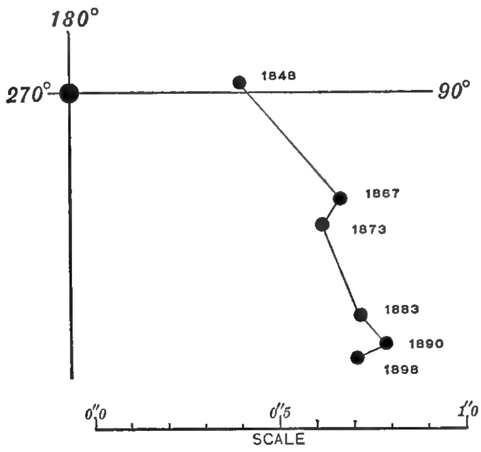
33 39 **1363.** **A. G. 44.** Double in *A. G. Leiden.* Measures by β^6.

33 40 **1364.** **33** *Arietis.* **Σ 289.** (= **H IV. 5 = Sh 33.**) Relatively fixed, but common proper motion of 0″180 in 131°8 (Bossert).

1865.12	359°6	28″63	3*n*	Δ
1880.61	360.0	28.65	3*n*	β
1904.77	360.1	28.64	2*n*	β

[Ma (*F. S.* I)...Ma (X, XIII, XV)...OΣ (IX)...WS...Gl...Δ (II)...β^2...β^3...Per...Per (2684)...*Annals Toulouse Obsy.* III...β^6]

1365. **OΣ 43.** In slow motion, and probably binary, but some of the measures are not very harmonious. 33^m 42^s



OΣ43

1848.72	93°0	0″46	2*n*	OΣ
1867.30	68.4	0.79	3*n*	Δ
1873.65	62.3	0.77	3*n*	Δ
1883.90	52.6	0.99	3*n*	Per
1890.06	51.6	1.08	3*n*	T
1898.42	47.4	1.05	4*n*	Hu

[OΣ (IX)...Δ (1806)...Δ (I)...Do (:330)...Flm...T (3186)...Per...Per (2684) Sk^2...En (2678)...Doolittle (*Pub. Flower Obsy.* I)...Lewis (*Mon. Not.* LIX, 400)...Hu (*Pub. L. O.* V)...HΣ (XII)...]
(See p. 1060)

1366. **A. G. 45.** From *A. G. Leipzig.* 33 49

1367. **A. G. 46.** Noted as double in *A. G. Lund.* Measures by β^6 33 53

1368. **Lewis 2.** Discovered by Lewis at the Greenwich Observatory. Not identified in any star catalogue (*Mon. Not.* LIX, 402). 34 :

1369. **H 2151.** "Extremely difficult." Another observation, 132°0: 10″±: 8...16. In O. Arg. 7 m. 34 1

1885.96	118°5	15″85	1*n*	HΣ (XII)	
1903.78	115.5	15.90	2*n*	β^6	6.9...13.1

1371. **A. G. 47.** From *A. G. Leipzig.* 34 12

1902.97	312°3	22″13	3*n*	Cogshall

1372. **H 1123.** "In M 34." No indication of motion: 34 15

1879.79	248°9	20″10	2*n*	β	
1903.85	247.3	19.77	2*n*	β	8.7...8.7

[β^3...β (*Mon. Not.* XL, 508)...Cin^6...β^6...]

34^m 23^s **1373.** **H 1124.** "In southern part of M 34." This is in a low power field *p* OΣ 44. The distance in H is much underestimated.

1904.85	151°1	16″62	2*n*	β⁶	8.8...12.4

34 23 **1374.** **Σ 291.** (= **S 415.**) Distant star from South. No change in AB, and probably none in C.

		A and B		
1867.61	117°8	3″31	4*n*	Δ
1887.78	118.2	3.40	2*n*	T
1897.95	118.7	3.56	2*n*	Coleman
		A and C		
1892.81	240.8	65.91	2*n*	Gla
1897.95	241.5	65.07	2*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...H¹...Se...Se³...Wr...H (**V**)...Ra (**XXIV**)...Δ (1185)...Δ (**I, II**)...T (2898)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

(See p. 1060)

34 31 **1375.** **OΣ 44.** Change doubtful. The pair found by Δ (1736) *nf* OΣ 44 is H 2155.

1869.48	54°6	1″40	6*n*	Δ
1883.88	63.0	1.47	6*n*	En
1898.39	57.0	1.45	4*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (1736, 1808)...Δ (**I**)...Du...Sk³...Cin⁶...En (2678)...Per...Per (2749)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIV**, 790)...Hu (*Pub. L. O.* **V**)...]

34 33 **1376.** **Espin 8.** Discovered by Espin. This is B. A. C. 819.

1903.87	39°1	12″62	2*n*	β	6...14

[Espin (3717)...β⁶...]

(See p. 1060)

34 39 **1378.** **OΣ 45.** Without change.

1868.16	295°4	1″71	5*n*	Δ
1898.47	291.4	1.44	3*n*	Hu

[Ma (**XI, XIII**)...Se...Δ (1806)...Δ (**I**)...OΣ (**IX**)...Cin⁶...Hu (*Pub. L. O.* **V**...]

34 44 **1380.** **A. G. 48.** Measures from *A. G. Leipzig.*

1902.79	212°8	3″33	3*n*	Miller

34 48 **1381.** **H 1126.** "No particulars. In M 34."

34 51 **1382.** **A. G. 49.** Double in *A. G. Lund.* Measures by β⁶.

34 54 **1383.** **Σ 292.** (= **H IV. 64 = S 416.**) Fixed. B is DM (39°) 611.

1865.97	210°5	23″02	3*n*	Δ
1888.93	211.0	23.03	4*n*	Giac
1904.77	210.7	22.96	2*n*	β

[Ma (*F. S.* **I**)...Ra (**XXII, XXIII**)...OΣ (**IX**)...Δ (1204)...Per...Per (2684)...Δ (**I, II**)...Giacomelli (**I**)...β⁶...]

34^m 59^s **1384.** *Persei* 67. **β 521.** A naked-eye star in *Perseus*, Heis 6–7 m, Lalande 4942. Discovered with the 18½-inch. Without change.

1885.95	153°1	5″63	2*n*	HΣ
1891.97	154.5	5.62	2*n*	β

[β (**X**)...β¹...β (3114) (*Pub. L. O.* **II**)...HΣ (**XII**)...]

(See p. 1060)

35 1 **1385.** **H 2155.** Dembowski (1736) measured this in observing OΣ 44. The stars are probably fixed. The principal star is DM (42°) 607.

1869.44	321°2	17″24	4*n*	Δ	7.6...10.0
1904.79	321.3	17.05	2*n*	β	

[Δ (1736)...Δ (**I**)...Cin⁶...β⁶...]

35 4 **1386.** 84 *Ceti.* **Σ 295.** The distance has remained constant, but the angle is slowly decreasing.

The system has a common proper motion:

Porter	0″216 in 126°3
A. G. Nico.	0.254 in 122.6

1864.94	325°0	4″65	7*n*	Δ
1879.00	325.1	4.84	3*n*	Hl
1895.90	323.2	4.68	2*n*	Collins
1897.97	320.2	4.59	2*n*	Coleman
1899.76	320.6	4.46	7*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Hd...OΣ (**IX**)...WS...Du...Δ (1473)...Δ (**II**)...Se...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Do (2196, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β¹...β²...β³ (p. 326)...Cin⁴...Cin⁶...Wilson (Cin¹⁰)...Per.. Per (2684)...Gl...Flm...**T** (2991)...Glasenapp (**II**)...Collins (*A. J.* 378)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...]

35 9 **1387.** **See 19.** Discovered at the Lowell Observatory.

1899.79	326°3	0″52	3*n*	Cg	7.5...8.8

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

35 21 **1388.** **Σ 294.** The star in the field *nf* is L 4972. This is 126″62 from Σ 294, in the direction of 35°2 (1903.63).

1869.25	99°9	7″04	4*n*	Δ
1897.40	99.8	7.36	5*n*	Doo
1903.66	100.4	7.36	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

35 31 **1389.** **Σ 293.** Certainly motion, but the measures are not sufficient to decide as to its character; probably rectilinear.

1845.23	66°8	7″30	2*n*	Ma
1852.65	68.6	....	1*n*	Ma
1866.07	71.2	7.67	3*n*	Δ
1878.65	75.3	8.30	1*n*	β
1897.06	79.1	8.67	3*n*	A

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (1735)...Δ (**II**)...Gl...Flm...β¹...Collins (*A. J.* 378)...A (3465)...]

35^m 36^s **1390.** *μ Arietis.* **β 522.** Discovered with the 18½-inch. The proper motion of this star is 0″.042 in the direction of 162°.3 (Auwers). The change in distance is undoubtedly due to the proper motion of A.

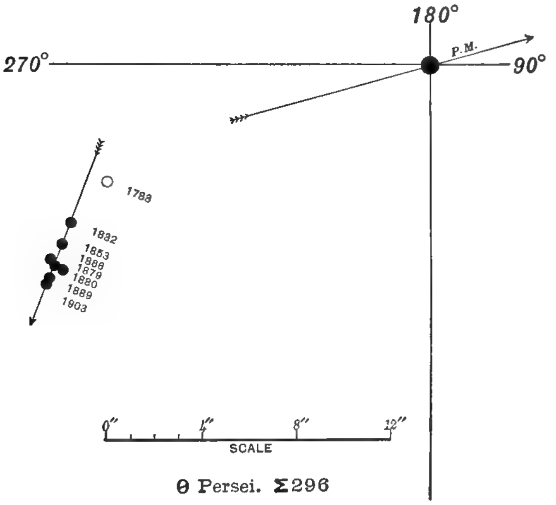
1892.00	263°.1	19″.25	3*n*	β
1898.71	263.9	19.36	1*n*	β

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

35 59 **1393.** *θ Persei.* **Σ 296.** (= **H** **III.** 58). The bright star has considerable proper motion:

Bossert	0″.339 in 105°.6
Auwers	0.340 in 105.2

So far the relative motion is rectilinear, and apparently they form a pair of the 61 *Cygni* class, the components having slightly different proper motions.



θ Persei. **Σ**296

The more distant star, C, is fixed in space. The measures of OΣ and β, having an interval of fifty years, give for the proper motion of A:

0″.352 in 104°.2

A and B

1783.66	290°.0	13″.52	1*n*	H
1832.20	294.6	15.40	3*n*	Σ
1853.09	296.8	16.05	3*n*	OΣ
1866.41	297.2	16.37	6*n*	Δ
1879.08	298.0	16.69	1*n*	Hl
1880.15	299.0	16.49	2*n*	β
1889.05	299.3	17.07	2*n*	Hl
1903.81	299.6	17.28	3*n*	β

A and C

1853.09	210°.8	66″.11	3*n*	OΣ
1869.95	215.6	68.17	1*n*	OΣ
1880.15	218.4	69.24	2*n*	β
1888.14	220.3	70.06	1*n*	Eng
1903.81	224.3	73.23	3*n*	β

Ma (*F. S.* **I**)...Ma (**XV**)...H (**V**)...Gl...WS...Flm...Flm (*Observatory* **I**, 245) ...Sk^2...Sk^5...Sadler (*Ast. Reg.* **XXIII**, 117)...Hl (**I, II**)...Pk...β^2...β^3... ΘΣ (**IX**)(**X**, p. 59)...Δ (**II**)...Δ (1473)...En (2663)...Engelhardt (**II**)...HΣ (**XII**)...Espin (*Mon. Not.* **LXII.** 528)...β^6...]

1396. **Σ 297.** (= **S** 417). No sensible change. 36^m 39^s

A and B

1867.25	277°.7	15″.83	3*n*	Δ
1881.67	277.6	16.25	3*n*	β
1903.81	277.8	15.86	2*n*	β

A and C

1867.25	107°.0	28″.44	3*n*	Δ
1881.67	106.6	28.50	3*n*	β
1903.81	106.1	28.52	2*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...β^4...β^6...]

1397. **H** 654. The R. A. in H is 1^m too small. The only measures are: 36 49

1903.82	45°.0	32″.10	3*n*	β^6	7.4...10.0

1398. *Arietis* 107. **β 306.** Discovered with the 6-inch. This is a naked-eye star in *Aries* (B. A. C. 834). Bossert gives the large star a proper motion of 0″.163 in 90°. If this is correct, the small star is moving with it. 36 53

1881.78	19°.6	3″.10	2*n*	Ho
1886.00	17.5	3.18	2*n*	HΣ
1887.95	21.5	3.03	3*n*	Hl
1892.85	18.9	3.11	3*n*	Bar
1901.75	20.1	3.17	4*n*	Doo

[β (**VI**)...β (2062)...Δ (**I**)...OΣ (**X**)...HΣ (**XII**)...Hl (2147)...Hl (**I, II**)... Ho (2978)...Barnard (*A. J.* 447)...Doolittle (*A. J.* 547)...]

1400. **H** 3523. The place in H is approximate only. No stars here of this magnitude in Cord. DM. 37 ·

[H (**VIII**)...H^3...]

1401. *γ Ceti.* **Σ 299.** The angles are very discordant for so easy a pair, but on the whole it is very doubtful if any change has taken place. The components have a common proper motion, and therefore probably form a physical system. 37 5

Auwers	0″.220 in 229°.6
Boss	0.227 in 225.9

A few of the many measures are:

1841.65	288°.9	2″.72	11*n*	Da
1853.09	287.3	2.92	8*n*	OΣ
1866.01	289.0	2.78	5*n*	Δ
1877.99	285.9	3.04	4*n*	Hl
1885.09	288.4	3.00	3*n*	Hl
1894.00	288.0	2.71	2*n*	Maw
1903.12	291.4	3.11	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII**)...K...P^1...Fl...Da^1...Da^2...Da^3... H (**VII**)...H^1...H^2...Bp...Ra (**XXII**)...Ba (**II, III**)...Bru...Se...Se^3... Se (1017)...En...En (1673)...Δ (1013, 1256)...Δ (**I, II**)(*Mem. Accad. Sci.*) ...WJ^2...Hd...Gl...Sp (2132)...Sp (**II**)...Flm...Pl...Do (2196, 2989, 3930)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Pk...β^2...Sk...Pt...Per...Per (2684)...T (2866)...Lv^1...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Hayn (3051)...Je (2449)...Cin^6...*Proc. Haverford Coll. Obsy.* 1891, 1892...OΣ (**IX**)...Glasenapp (**II, III**)...Maw (**II**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII, LIV**)....Solá (3497, 3679)....*Annals Toulouse Obsy.* **III**.... Sk^6...]

37m 27s **1404.** **H 3524.** The only measures since H are:

1892.82	144°.5	19″.18	2*n*	Gla	6.8...7.8
1897.75	144.5	20.43	1*n*	See	6.9...9.5

[Glasenapp (II)...See (3495)...]

37 29 **1405.** **Σ 300.** (=H I. 74 = S 418.) There may be a little advance in the angle, but the motion, if any, is very slow:

1866.42	302°.0	2″.89	3*n*	Δ
1883.09	304.9	3.15	6*n*	En
1891.35	304.1	3.02	3*n*	HΣ

[H^1...Ma (*F. S.* **I**)...Ma (**X, XV**)...Bp...Ra (**XXIII**)...Se...Da^3...Se^3...Ba (**II**)...Sk^3...Δ (1118)...Δ (**I, II**)...Pl...En (2663)...*Proc. Haverford Coll. Obsy.* 1892...HΣ (**XII**)...]

38 24 **1407.** **H 2157.** (=Σ 298 *rej.*) H says Σ overlooked the close star. I found this in 1874 smaller than either of the other companions. The only measures are:

AB	1903.78	286°.7	11″.06	2*n*	β^6	8.0...11.5
AC	1903.78	21.0	24.41	2*n*	β^6	...10.8
AD	1903.78	65.0	33.46	2*n*	β^6	...11.2

38 32 **1409.** **β 261.** Discovered with the 9.4-inch at the Dartmouth College Observatory. Apparently unchanged.

1877.91	97°.7	3″.02	2*n*	Cin
1885.19	99.3	2.87	3*n*	W
1898.77	100.1	2.88	4*n*	Cg

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Cin^3...Cin^4...Wilson (Cin^{10})...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Cogshall (*A. J.* 478)...]

38 35 **1410.** **Σ 303.** Probably fixed.

1867.89	179°.5	5″.56	4*n*	Δ
1892.74	181.9	5.13	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...β^1...Cin^6...Glasenapp (**II**)...]

38 45 **1411.** **Howe 7.** Discovered by Howe at the Cincinnati Observatory.

1884.85	352°.4	4″.21	1*n*	Wilson

[Cin^4...Cin^6...Wilson (Cin^{10})...]

38 46 **1412.** **Arg. 9.** (=**Hu 204.**) Noted double in *O. Arg. N.* The only other measures are:

1900.87	143°.4	3″.17	3*n*	Hu	8.5...8.5
1904.13	145.6	3.04	2*n*	Biesbroeck	

[β^5...Hu (*A. J.* 494)...Biesbroeck...]

38 53 **1413.** **B. A. C. 854.** Double in Brisbane; measures from H^3. No evidence of change.

1878.90	187°.8	11″.63	1*n*	Cin

[H^3...J^2...Cin^4...Cin^5...Cin^6...]

38 59 **1414.** **A. G. 50.** Double in *A. G. Bonn.* Measures by Kustner (3821).

1415. **Σ 301.** Fixed. 39m 6s

1866.70	16°.6	8″.25	3*n*	Δ
1901.00	16.3	8.05	4*n*	Es

[Ma (*F. S.* **I, II**)...H (**V**)...Wr...Δ (**II**)...Glasenapp (**II**)...Espin (*Brit. Ast. Ass'n* **III**, 229)(*Mon. Not.* **LXII**, 528)...]

1417. **Hn 64.** No other measures (*Pub. Washburn Obsy.* II, III). 39 20

1418. **β 9.** Discovered with the 6-inch. Probably no sensible change. 39 40

1883.72	162°.6	1″.73	6*n*	En
1885.95	162.3	1.63	3*n*	HΣ
1900.79	162.3	1.74	3*n*	Doo
1904.10	167.5	1.97	3*n*	β

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Δ (**I**)...En (2678)...OΣ (**X**)...Maw (**II**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

1419. **Hu 205.** Discovered by Hussey (*A. J.* 494). 39 43

1420. **β 83.** Discovered with the 6-inch. Change in angle is clearly shown by the measures, and it is probably a binary system. 40 0

1877.91	122°.2	1″.00	2*n*	Cin
1886.85	116.2	0.98	4*n*	LM
1891.77	111.7	0.90	3*n*	β
1896.06	106.6	0.83	3*n*	Sp
1898.79	104.3	1.00	3*n*	A
1901.98	101.7	1.03	3*n*	Doo
1903.19	105.4	0.96	2*n*	A

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β (3114)(*Pub. L. O.* **II**)...Cin^4...LM...Lv^1...Collins and Jones (*Proc. Haverford Coll. Obsy.* 1891, 1892)...Sp (**III**) A (3584)...Doolittle (*A. J.* 547)...]

1421. **Σ 302.** Fixed. 40 8

1867.45	167°.9	5″.09	3*n*	Δ
1904.77	167.3	5.19	2*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...Ma (**XI**)...Δ (**II**)...β^6...]

1422. **β 307.** Discovered with the 6-inch. The principal star was thought to be slightly elongated with the same instrument on Mt. Hamilton in 1879, and it was entered in the list of new pairs discovered at that place as β 740. A subsequent examination with the 18½-inch at Chicago failed to show any certain elongation. It appeared round with the 36-inch in 1890; Sp found it single in 1887, 1888, and 1889, and also Doolittle in 1900. It may, therefore, be rejected as a close pair. 40 29

1877.18	315°.9	15″.44	3*n*	Hl
1877.72	315.4	14.91	1*n*	β
1880.92	316.0	15.49	1*n*	β

[β (**VI, XI**)...β^1...β^3...β (2062, 3048)(*Pub. L. O.* **I, II**)...Hl (**I**)...Sp (**III**)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I**)...]

$40^m 33^s$ **1423.** A. G. 51. Double in *A. G. Lund.* Measures by β^6.

40 33 **1424.** **β 262.** Discovered with the 9.4-inch at the Dartmouth College Observatory. The *p* star of a small equilateral triangle. But little, if any, change.

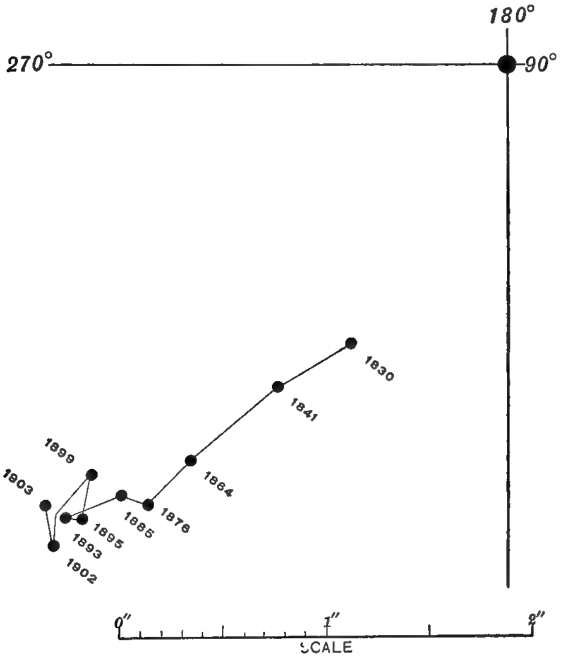
1881.85	68°4	1″34	2*n*	Ho
1884.75	72.4	1.93	6*n*	En
1891.75	61.6	1.64	4*n*	β
1895.89	59.7	1.59	2*n*	Lewis
1897.89	62.3	1.50	4*n*	Bowyer
1898.73	63.7	1.60	2*n*	β
1901.37	63.9	1.62	3*n*	Bowyer

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....β (3114)(*Pub. L. O.* **II**)....Δ (**I**).... En (2742)...Ho (2978)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIV**, 790)...]

40 40 **1426.** **Σ 304** *rej.* From *Catalogus Novus.* In DM 7.0.

1904.35	289°7	24″94	2*n*	β^6	7.5...9.0

40 41 **1427.** *Arietis* 114. **Σ 305.** For many years after the measures of Struve, the motion appeared to be rectilinear and uniform, and hence the change was presumably due to proper motion. In recent years the motion in distance has been arrested, and it seems now that the companion is moving in a very elongated ellipse. The period is necessarily a long one, and nothing can be inferred from the measures to this time as to the real or apparent orbit. The system has a proper motion of 0″174 in 150°2 (Battermann).



Σ 305

The following measures will show the relative change to 1903:

1830.95	330°9	1″59	3*n*	Σ
1841.94	324.7	1.96	6*n*	Da
1864.74	321.6	2.50	7*n*	Δ
1876.07	321.0	2.79	3*n*	Hl
1885.09	318.3	2.83	3*n*	Hl
1893.13	315.9	3.09	3*n*	Maw
1895.91	317.2	3.03	2*n*	Collins
1899.02	314.8	2.85	2*n*	Bowyer
1902.97	316.9	3.23	3*n*	Do
1903.40	313.9	3.11	5*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X**)...Ba (**II**, **III**)...Da³...Se...H (**V**)...OΣ (**IX**)...Bp... Δ (1109, 1473)...Δ (**I**, **II**)...Ferr...Gl...Bru...Bru²...Sp (**II**)...Sp (2132) ...En (1673, 2663)...Flm...Pl...Do (2196)(*Trans. R. I. Acad.* **XXIX**, Part 13)...WS...WS²...Sk...Per...Per (2684)...Hl (*Wash. Obsns.* 1885)...Hl (**I**, **II**).... Giacomelli (**I**)....*Proc. Haverford Coll. Obsy.* 1892.... Lv¹....T (2898)...Je (2449)...Glasenapp (**II**)...Do (3798, 3930)...Maw (**II**)...Big (*Bul. Ast.* **XII**, 299)...Lewis (*Observatory*, **XIX**, 86)...Collins (*A. J.* 378) ...Solá (3563)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Je (3802)...Maw (**IV**)...Sk⁵...Coleman (*Mem. R. A. S.* **LIV**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 790)...]

(See p. 1060)

1430–31. **H².** (Nos. 763–4.) These two pairs are certainly identical with Σ 306 and Δ's triple in the same field, unless error in H's place. It is difficult to harmonize the descriptions, but by assuming an error in the distance, the identity is apparent. (See Nos. 1438 and 1441). A careful examination with the 40-inch in 1903 confirmed this view, and made it certain that the first of these pairs is AC of Σ 306, and the other AC of β 1316. $41^m 16{:}^s$

1432. **Σ 309** *rej.* From *Catalogus Novus.* Double in *A. G. Leipzig.* 41 24

1903.94	8°8	25″91	2*n*	β^6	8.6...9.0

1433. **β 1002.** Discovered with the 12-inch. Unchanged. 41 29

1886.76	336°6	1″64	1*n*	LM	8.0...11.8
1898.87	333.6	1.56	2*n*	Cg	7.8...12.7

[β (**XIII**)...β⁸...LM...Cogshall (*A. J.* 478)...]

1435. A. G. 52. Measures from *A. G. Leipzig.* 41 38

1436. **Σ 308.** Unchanged. The principal star is SD (10°) 549. 41 40

1868.05	333°6	20″85	4*n*	Δ
1904.74	334.4	21.05	2*n*	β

[H (**V**, **VIII**)...Δ (**II**)...Glasenapp (**II**)...β⁶...]

1438. **Σ 306.** The third star C added by Δ. There is no change in either companion. Espin measures two distant stars. (See No. 1430.) 41 52

AB	1868.03	92°7	2″14	4*n*	Δ
	1903.88	93.9	2.12	3*n*	β
AC	1903.87	158.2	27.18	2*n*	β

[Ma (*F. S.* **I**)...H¹...Se...Δ (1736)...Δ (**II**)...Ferr...Espin (*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n* **III**, 227)...β⁶...]

41m 55s **1439.** **β 523.** Discovered with the 18½-inch. In the field with Σ 310.

1898.76	208°6	1″65	3*n*	*β*	9.0...9.9

[*β* (**X**)...*β*1...*β* (*Pub. Y. O.* **I**)...]

(See p. 1060)

41 56 **1440.** *η Persei.* **Σ 307.** (= **H IV. 4 = Sh 34.**) No change in AB. There are several faint stars in the field nearer than the one measured by Sh, 204°8:237″17 (1821.97). One of these, which is given with my approximate measures, has a very faint companion. This was first seen by Isaac W. Ward with an aperture of 4.3 inches. There is another small star a little nearer A than C, 29°4:58″. The proper motion of the large star is very small, 0″025 in 144°1 (Auwers).

AB	1867.93	300°5	28″39	4*n*	*Δ*
	1904.77	300.9	28.14	2*n*	*β*
AC	1904.77	268.8	66.77	2*n*	*β*
C*c*	1904.77	114.0	5.32	2*n*	*β*

[Ma (*F. S.* **I**)...H1...P1...H (**V**)...*Gr. Obsns.* 1840...Ma (**XI, XV**)...Ma (304)...*Δ* (**II**)...Pk...*β*6...]

42 0 **1441.** **β 1316.** (ACD = Δ —) The wide triple in the field with Σ 306 was first noted and measured by Dembowski, although Herschel appears to have observed AD. (See No. 1431). In measuring this triple with the 40-inch, the principal star was found to be a very close pair, of which a single measure was made. It has since been measured at Mt. Hamilton:

1904.27	280°7	0″23	1*n*	A	8.7...9.0

There is no change in C and D since the measures of *Δ*:

		AB and C			
1903.88	19°4	10″43	3*n*	*β*	8.7...10.7
		AB and D			
1903.88	10°1	19″95	3*n*	*β*	...10.8
		Σ 306 (A) and AB			
1903.86	156°6	123″79	1*n*	*β*	

[*Δ* (**II**, p. 59)...*β*6...A ( )...]

42 0 **1442.** **Ho 217.** So far unchanged.

1897.13	276°8	2″16	2*n*	A

[Ho (2977, 3558)...A (3465)...]

(See p. 1060)

42 5 **1444.** **Lv 2.** From LM. No other measures.

(See p. 1060)

42 7 **1445.** **Σ 310.** There is no motion.

1868.78	92°4	2″65	4*n*	*Δ*
1879.45	90.2	2.58	2*n*	*β*
1894.15	92.1	2.78	3*n*	HΣ

[H (**VII**)...Ma (*F. S.* **I**)...*Δ* (**II**)...*β*1...*β*3...HΣ (**XII**)...]

42 12 **1446.** **A. G. 53.** Noted as elongated in *A. G. Lund.* I could see no sign of duplicity with the 40-inch on two nights, 1902.75.

1447. Measured in looking for Nos. 1430 and 1431. (*β*6). 42m 20s

1448. *π Arietis.* **Σ 311.** (= **H I. 64 = Sh 35.**) There is certainly no change in C. The measures of B are discordant for so easy a pair, but there is probably no motion. The proper motion of the principal star is 0″016 in 273°6 (Auwers). 42 36

1782.82	109°1	....	1*n*	H
1864.27	120.4	3″32	5*n*	*Δ*
1879.94	122.5	3.29	6*n*	Hl
1883.11	120.3	3.45	6*n*	En
1889.03	121.7	3.24	2*n*	Hl
1902.79	120.7	2.96	1*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Ra (**XXIII**)...Se1...Se3...Da1...Da3 Hd...Wr...Gl...OΣ (**IX**)...Sp (**II**)...Sk3...*Δ* (**II**)...En (2663)...*Proc. Haverford Coll. Obsy.* 1891....Pk....Hl (**I, II**)....Collins (*A. J.* 378)....Glasenapp (**IV**)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...Do (3930)...Biesbroeck...]

1449. **OΣ 46.** (AC = **H 656.**) The close star is not mentioned by H, nor the distant attendant by OΣ. The only measures of the latter are: 42 49

1877.72	167°5	20″60	1*n*	*β*
1903.81	169.1	19.61	2*n*	*β*

The close pair is erroneously called new by Hl (II). No sensible change.

1871.31	74°1	4″80	4*n*	*Δ*
1889.03	72.0	4.83	2*n*	Hl
1898.72	72.0	4.97	3*n*	Hu
1903.81	71.5	4.65	2*n*	*β*

[H (**III**)...OΣ (**IX**)...*Δ* (**I**)...*β*1...Hl (**II**)...Hu (*Pub. L. O.* **V**)...*β*6...]

1450. 41 *Arietis.* **OΣ 47.** (AC = **H V. 116**; AD = **H VI. 5 = Sh 36.**) The change is due to the proper motion of A, which is given: 42 55

Newcomb	0″130 in 148°7
Auwers	0.117 in 154.1

		A and B		
1852.15	255°1	18″75	1*n*	OΣ
1871.05	261.6	20.83	5*n*	*Δ*
1879.40	265.8	21.18	2*n*	*β*
1887.03	267.7	21.36	4*n*	Eng
1898.79	271.2	22.92	4*n*	Hu
1903.81	272.4	22.54	3*n*	*β*
		A and C		
1783.70	189°2	39″33	1*n*	H
1852.15	199.1	35.46	1*n*	OΣ
1872.79	203.6	34.45	2*n*	*Δ*
1879.40	203.5	34.03	2*n*	*β*
1887.06	206.0	32.72	7*n*	Eng
1898.79	207.6	32.82	4*n*	Hu
1903.81	209.2	32.06	3*n*	*β*
		A and D		
1781.79	260° ±	125″58	1*n*	H
1852.14	228.7	127.11	2*n*	OΣ
1877.78	229.9	126.86	1*n*	*Δ*
1879.93	230.2	125.90	2*n*	*β*
1886.43	230.4	125.50	5*n*	Eng
1898.78	231.3	125.92	2*n*	Hu
1903.81	231.1	125.19	3*n*	*β*

From the measures of the companions Hussey finds the proper motion of A:

0″.139 in 145°.3

[OΣ (**X**) . . . Δ (I) . . . Flm . . . β 8 . . . Engelhardt (2785) (**II**) . . . Pk . . . Hu (*Pub. L. O.* **V**) . . . β 6 . . .]

43^{m} 13^{s} **1451.** **A. G. 54.** From *A. G. Leipzig.*

1902.94	1°.4	29″.89	2*n*	Cogshall

43 26 **1452.** **Σ 313.** Fixed.

1866.21	192°.0	5″.20	3*n*	Δ
1904.74	193.2	5.41	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Δ (**II**) . . . *Proc. Haverford Coll. Obsy.* 1892 . . . β 6 . . .]

43 30 **1454.** **Σ 315.** Without change.

1865.91	156°.7	2″.30	3*n*	Δ
1886.89	157.6	2.68	3*n*	LM
1892.84	156.8	2.46	2*n*	Jones

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . H (**VIII**) . . Se . . . Δ (**II**) . . . LM . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Glasenapp (**II**) . . .]

43 41 **1455.** Measured in looking for Nos. 1430 and 1431 (β^{6}).

44 11 **1457.** **Σ 312.** (AC = **H 2159.**) No change in the distant star, but probably some motion in AB:

1866.42	17°.5	3″.26	3*n*	Δ
1874.58	19.5	3.00	7*n*	Du
1889.94	19.5	3.22	3*n*	Hl
1903.10	22.1	3.00	2*n*	Do

[Ma (*F. S.* **I**) . . . . Ma (**XI**) . . . H (**V**) . . . Ra (**XXIII, XXIX**) . . . Δ (1204) . . . Δ (**I, II**) . . . En (1673) . . . Do (2989, 3798, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Du . . . Se . . . Flm . . . OΣ (**IX, X**) . . . Seagrave (*Sid. Mess.* **II**, 274) . . . Hl (**I, II**) . . . Je (2449) . . . Glasenapp (**II**) . . . Collins (*A. J.* 378) . . . Ebell (3321) . . .]

44 17 **1458.** **H 3533.** "*Yellow : bluish.*" B is O. Arg. S. 1840. The only measures are:

1892.90	272°.4	39″.73	2*n*	Gla	6.5 . . . 7.3

[Glasenapp (**II**) . . .]

(See p. 1060)

44 21 **1459.** *Persei* 85. **Σ 314.** (= **H̶ I. 38** = **S 419.**) Slow increase in the angle is probable, with but little change in the distance.

1782.63	278°.4	. . . .	1*n*	H̶
1804.18	290.6	. . . .	1*n*	H̶
1852.44	297.7	1″.63	4*n*	OΣ
1869.94	298.7	1.58	5*n*	Δ
1889.94	301.8	1.56	3*n*	Hl
1895.86	301.1	1.71	2*n*	Collins
1900.10	303.3	1.50	2*n*	Sk

[Ma (*F. S.* **I**) . . . Ma (**X, XI, XIII, XV**) . . . H (**V**) . . . Se . . . Da 1 . . . Δ (*Mem. Accad. Sci.*) . . . Δ (1013, 1256) . . . Δ (**I, II**) . . . Gl . . . Flm . . . Do (2316) . . . Sk 2 . . . OΣ (**IX**) . . . Seagrave (*Sid. Mess.* **II**, 274) . . . Hl (**I, II**) . . . Je (2449) . . . En (2663) . . . Glasenapp (**II**) . . . Collins (*A. J.* 378) . . . Maw (**III**) . . . Sk 5 . . . Espin (*Mon. Not.* **LXII**, 528) . . .]

1460. **β 10.** Discovered with the 6-inch. Unchanged. 44^{m} 23^{s}

1877.85	96°.2	2″.80	2*n*	Cin
1899.85	96.2	2.78	5*n*	Doo

[β (**I**) . . . β (*Mon. Not.* **XXXIII**, 351) . . . Δ (I) . . . Cin 4 . . . Cin 6 . . . Brown (3645) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

1462. γ *Fornacis.* **β 877.** (AC = **H 2161.**) The faint companion was detected with the 18½-inch. Porter finds the proper motion of A, 0″.155 in the direction of 205°.9. The measures of C give 0″.178 in 203°.8. It is certain, therefore, that A and B are moving together, and that C is not a member of the system. 44 32

A and B

1891.96	145°.5	12″.03	2*n*	β
1898.94	143.7	11.69	3*n*	Bd

A and C (= H 2161)

1830	169°.4	45″ ±	1*n*	H
1891.96	155.6	47.24	2*n*	β
1898.94	153.3	46.71	3*n*	Bd

[β (**XIII**) . . . β 3 . . . β (3114) (*Pub. L. O.* **II**) . . . Boothroyd (*A. J.* 478) . . . H (**V**) . . . *Mon. Not.* **LXI**, 580 . . .]

1463. **Σ 316.** Change in distance? 44 34

1866.40	135°.4	14″.06	3*n*	Δ
1879.81	135.0	14.40	2*n*	β
1897.85	134.0	14.20	3*n*	Doolittle

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . β 3 . . . T (2898) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

1464. **H 3535.** "A strong suspicion that this star is a close double, but no time to verify the suspicion." I found it very uncertain with the 6-inch in 1873, and single with the 36-inch in 1890. Wilson thought it elongated in 1883–84. 44 42

[Wilson (Cin 10) . . . β (3048) (*Pub. L. O.* **II**) . . .]

1465. **Ho 218.** Discovered by Hough (2977). 45 7

1466. **OΣ 48.** Without change. 45 11

1870.96	314°.8	6″.44	5*n*	Δ
1883.62	323.3	7.55	5*n*	En
1898.68	318.9	6.66	3*n*	Hu

[Ma (**XIII**) . . . Δ (I) . . . En (2678) . . . Hu (*Pub. L. O.* **V**) . . .]

1467. τ^{2} *Eridani.* **See 20.** The distance in See is too large. 45 36

1899.02	126°.6	46″.87	1*n*	Bd
1904.69	130.1	46.53	2*n*	β

[See (*A. J.* 431) . . . Boothroyd (*A. J.* 505) . . . β 6 . . .]

1468. τ *Persei.* In measuring the faint star B, first noted by D. W. Edgecomb, the small attendant C was seen. The principal star has a proper motion of 0″.019 in 241°.4 45 45

(Auwers), and is a spectroscopic binary (Campbell, *Astrophysical Jour.*, XIV, 139). The only other measures of these companions are:

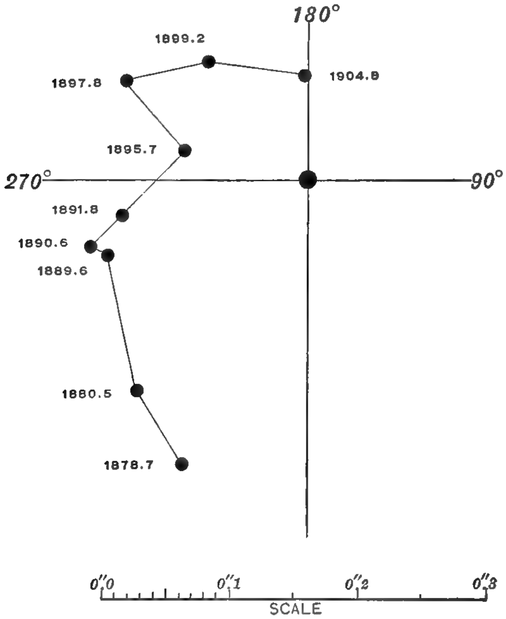
AB	1900.71	106°.6	50″.85	4*n*	β
BC	1900.74	81.7	4.58	1*n*	β

[β1...β5...]

$45^m\ 56^s$ **1470. β 1293.** Measured with the 40-inch in looking for Σ 324 *rej.* (β^5).

46 8 **1471.** 20 *Persei.* **β 524.** (AC = H III. 60 = S 420 = Σ 318.) The duplicity of the principal star was discovered with the 18½-inch. The distance never much exceeds 0″.2, so that it is always a difficult pair, and beyond the reach of most telescopes. With the measures down to 1891 I made an attempt to find an approximate orbit, which gave a period of 27.7 years, and Glasenapp, from the same apparent ellipse, found substantially the same elements. These results are of somewhat doubtful value from uncertainty in the adjustment of the measures as to quadrants.

In the following diagram I have given the principal measures with what seems now to be the most probable arrangement with reference to each other. The measures of the next few years will determine the form of the orbit:



20 Persei. β524

A and B

1878.72	336°.0	0″.25>	4*n*	β
1880.53	321.4	0.22	3*n*	β
1881.67	334.9	0.28	1*n*	β
1883.31	336.2	0.20	7*n*	En
1886.23	300.4	0.3±	1*n*	HΣ
1889.59	291°.3	0″.17	1*n*	β
1890.61	287.6	0.18	3*n*	β
1891.79	281.7	0.15	3*n*	β
1895.72	257.9	0.1>	2*n*	Bar
1895.72	251.5	0.16±	2*n*	See
1896.09	190.2	0.22	1*n*	L
1897.82	62.5	0.16	1*n*	β
1898.02	184.5	Elong.	2*n*	L
1899.30	44.6	0.13	4*n*	A
1903.14	29.6	0.12	1*n*	A
1904.83	5.7	0.16	2*n*	A
1904.84	1.5	0.1±	1*n*	β

AB and C (= Σ 318)

1829.14	236°.8	14″.08	2*n*	Σ
1851.79	238.2	13.99	1*n*	OΣ
1867.22	237.4	14.05	4*n*	Δ
1878.15	236.1	14.04	1*n*	β
1880.82	236.9	14.00	1*n*	β
1881.68	237.3	14.02	2*n*	β
1890.61	237.2	14.08	3*n*	β
1898.82	237.5	13.90	3*n*	β

The measures by Aitken of 1904.83 were received after this matter was in type, and too late to be shown on the diagram. It may be after all that the later positions are in the first quadrant, and that nearly one revolution has been described.

Auwers gives the proper motion of 20 *Persei*, 0″.081 in the direction of 141°.1. This would change the position-angle of C more than 20° in the interval covered by the measures if that star was fixed in space. As the measures show no relative change, the Herschel companion must be a member of the system.

[β (**X**)....β^1....β^3....β^4....β (2957, 3048, 3114) (*Pub. L. O.* **II**, pp. 31, 235) (*Ast. and A.-P.* **XII**, 404)...En (2678)...Barnard (*A. J.* 447)...See (*A. J.* 359)... Glasenapp (*Ast. and A.-P.* **XII**, 499) ... HΣ (**XII**) ... A (3638) ... Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 495; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)... Biesbroeck...] (See p. 1060)

There are other measures of the wide pair than those cited. All the observations will be found in the references above given, in the original catalogues of Herschel, South, and Struve, and in the following:

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...H (**IV**)...OΣ (**IX**)...Δ (**II**)...Bl (**V**)...]

1472. Σ 323. Probably fixed, but some of the measures are discordant. $46^m\ 19^s$

1866.39	281°.7	2″.62	3*n*	Δ
1877.08	282.6	2.81	3*n*	Sp
1892.83	282.8	2.77	2*n*	Jones
1895.85	282.0	2.74	2*n*	Gla

[H^1... Ma (*F. S.* **I**) ... Ma (**X, XII, XIII, XV**) ... Hd ... Δ (1204) ... Δ (**I, II**) ... Ra (**XXV**) this pair?... Se ... Se^3... Sp (**II**) ... Wilson (Cin ^{10}) ... Giacomelli (**I**)...Jones (*Proc. Haverford. Coll. Obsy.* 1892)...Glasenapp (**IV**.)..*Annals Toulouse Obsy.* **III**...]

1473. See 21. The only other measure is: 46 20

1899.68	94°.1	0″.36	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

$46^{m}\,24^{s}$ **1474.** **A. G. 56.** From *A. G. Leipzig.*

1903.82	111°.7	7″.27	1*n*	Miller

46 40 **1475.** **Σ 322.** Fixed.

1868.52	320°.8	5″.49	4*n*	Δ
1904.71	322.9	5.46	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI, XIII**) . . . Δ (**II**) . . . β6 . . .]

46 55 **1478.** **A. G. 57.** From *A. G. Leipzig.* The later measure is smaller in distance.

1903.21	350°.9	8″.75	2*n*	Cogshall

(See p. 1060)

46 58 **1480.** **Σ 321.** Fixed.

1866.88	21°.0	18″.35	3*n*	Δ
1904.77	22.0	18.26	2*n*	β

[Ma (*F. S.* I) . . . Δ (**II**) . . . Gl . . . β6 . . .]

47 5 **1481.** **A. G. 58.** "Obl.?" in *A. G. Lund.* Examined twice with the 40-inch in 1902, but no indication of duplicity.

47 8 **1482.** **Σ 317.** Without change. A third star *f* 15^{s} at 102°.4, H (IV).

1866.83	88°.4	3″.32	3*n*	Δ

[H (**IV, V**) . . . . Ma (*F. S.* I) . . . . Ma (**XI**) . . . . Δ (**II**) . . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . .]

47 58 **1483.** **H 658.** The only measures are from *A. G. Leipzig.*

1895.18	21°.6	18″.91	1*n*	A. G.	8.5 . . . 9.5

[*Schj.* (1485) . . . *A. G. Leipzig*, p. 246 . . .]

(See p. 1061)

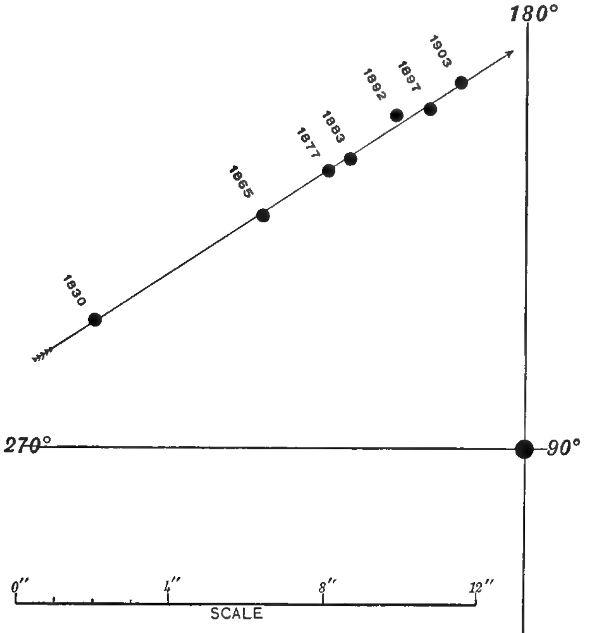
48 16 **1485.** **Ho 316.** Later measures give:

1904.77	284°.0	19″.18	2*n*	β

[Ho (3233) . . . β6 . . .]

(See p. 1061)

48 23 **1487.** **Σ 325.** Rectilinear motion. Upon the assumption that the small star is fixed in space, the measures of Σ, A, and β give 0″.156 in 302°.4 for the proper motion of A.



Σ 325

1830.98	253°.4	11″.70	2*n*	Σ
1865.43	228.2	9.05	5*n*	Δ
1877.81	215.2	8.82	2*n*	Δ
1883.62	211.0	8.71	7*n*	En
1892.80	200.9	9.26	3*n*	HΣ
1897.13	195.2	9.17	3*n*	A
1903.80	189.8	9.65	3*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . Flm . . . En (2663) . . . Gl . . . A (3465) . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* I) . . . Do (3930) . . . β6 . . .]

(See p. 1061)

1488. **Hd 59.** The Harvard place is substantially the same as that of Cord. DM (28°) 928, but that is not a double star of any class, and there is nothing in the vicinity answering the Hd description. It is certainly identical with β 261 which, is about 10^{m} preceding. There is a similar error in Hd 60. $48^{m}\,26^{s}$

1489. **Σ 324** *rej.* From H (V). Σ 324 was at first given as Cl. I–II (7) (12), but afterwards rejected as single. H does not seem to have been aware of its rejection, and was surprised at his failure to see Σ's companion, and was certain his companions could not have been seen by Σ. The principal star is 6 m in Rad. and DM. The 40-inch shows only one companion, Herschel's B. His distance is much underestimated. 48 27

1900.73	203°.4	24″.95	3*n*	β^{5}	6.7 . . . 12.2

$48^m\ 31^s$ **1490.** **Σ 326.** The distance seems to be decreasing, while the angle remains practically constant. It is probably a physical pair, as the considerable proper motion of 0″.341 in the direction of 123°.3 (Porter) is obviously common to both components.

1831.46	216°.1	9″.03	2*n*	Σ
1860.32	217.4	8.61	2*n*	OΣ
1867.13	217.2	8.48	5*n*	Δ
1879.89	216.3	8.38	2*n*	Hl
1887.95	216.4	8.13	2*n*	Hl
1903.05	219.2	7.74	2*n*	Do

[Ma (*F. S.* I)...Ma (**X**)...OΣ (**IX**)...Δ (**II**)...Flm...Sk^2...Per...Per (2684) Hl (**I, II**)...Do (3930)...]

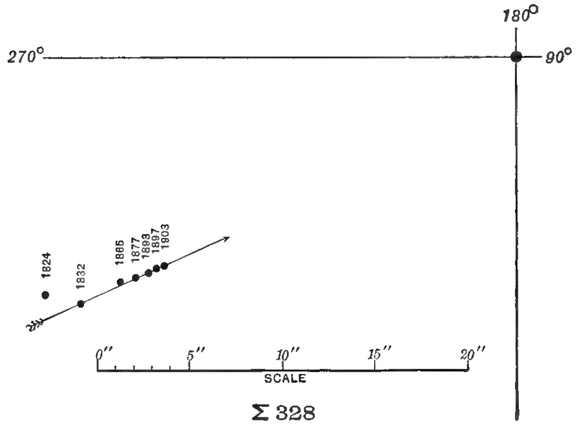
48 38: **1491.** **Hd 60.** In this, as in Hd 59, there is an error in the R. A. of about 10^m. It is closely *sf* β 261, and is the 9.6 m star, Cord. DM (28°) 877, the place of which is (1880):

R. A. = $2^h\ 38^m\ 44^s$
Decl. = −28° 28′

The only measures are:

1904.04	162°.5	9″.10	1*n*	β^6	9.8...11.3

49 48 **1492.** **Σ 328.** (= **S** 421.) The distance is diminishing from an annual proper motion of one of the stars of about 0″.07.



Σ 328

1824.87	296°.8	28″.41	2*n*	S
1832.18	299.5	27.06	2*n*	Σ
1865.22	299.6	24.65	4*n*	Δ
1877.65	300.0	23.70	1*n*	Flm
1893.95	300.4	23.00	1*n*	Sk
1897.47	300.4	22.51	5*n*	Doo
1903.81	300.8	22.04	3*n*	β

[Ma (*F. S.* I)....Δ (1473)....Δ (**II**)....Flm....Sk^4....Sk^5.... Doolittle (*Pub. Flower Obsy.* I)...β^6...]

50 7 **1493.** *Cephei* 47 (Hev.) **Σ 320.** No material change.

1868.50	230°.0	4″.53	4*n*	Δ
1904.77	230.3	4.51	2*n*	β

[Ma (*F. S.* I) ... H (**V**) ... Ma (**XI, XIII**) ... Δ (**II**) ... Do (2980) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk^3...Big...HΣ (**XII**)...β^6...]

1494. **Ho 317.** No other measures. $50^m\ 19^s$

[Ho (*A. J.* 215)(3233)...] (See p. 1061)

1495. **Kr 15.** Noted as double in *A. G. Hels.* 50 45

1898.63	109°.7	3″.76	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

1496. **A. G. 59.** From *A. G. Leipzig.* 50 57

1903.21	87°.3	24″.49	2*n*	Miller

1498. *Ceti* 478. **Σ 330.** Fixed. 51 4

1865.81	192°.1	8″.80	3*n*	Δ
1904.03	193.0	8.83	2*n*	β

[H (**VII**)...Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^4...Cin^6...β^1...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

1499. **H 2164.** "Very neat." Error of 1^m R. A. in H. 51 21

1904.77	320°.9	5″.26	2*n*	β^6	8.2...10.5

1500. **OΣ (App) 31.** The later measures give substantially the same result. B is Rad^1. 843. 51 36

1881.66	229°.4	73″.71	6*n*	β

[Δ (**II**)...β^4...Franz (2649)...]

1501. **β 1173.** Discovered with the 36-inch. The close pair is very difficult. The principal star (Lalande 5468) is 6.8 m in DM. The following are all the later measures: 51 38

		A and B		
1898.88	331°.3	0″.15	1*n*	Hu
1899.73	338.2	0.20	3*n*	Δ
1902.00	336.8	0.34	2*n*	Lewis
1903.04	332.0	0.09	2*n*	Lewis
1903.11	339.3	0.20	2*n*	Bowyer
		AB and C		
1898.88	284°.7	4″.86	1*n*	Hu
1898.96	288.3	4.32	1*n*	β
1899.70	283.8	4.74	3*n*	A

[β (**XVII**)....β (3047) (*Pub. L. O.* **II**)....Hu (*Bul. L. O.* No. 44)....A (3638).... Lewis and Bowyer (*Mon. Not.* **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...]

(See p. 1061)

1502. **Σ 332.** Fixed. 51 41

1867.63	53°.1	12″.29	4*n*	Δ
1894.40	53.4	12.14	5*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^1...Glasenapp (**II, IV**)...]

1503. **Innes 149.** Discovered at the Cape Observatory. 51 51

[Innes (3419) (*Mon. Not.* **LXI**, 580)...]

1505. **Σ 329.** Without change. 51 56

1866.10	272°.8	16″.01	3*n*	Δ
1904.77	272.8	15.97	2*n*	β

[Ma (*F. S.* I)...Δ (**II**)...Gl...β^6...]

51m 57s **1506.** **Ho 219.** A 13m star, 52°:39″, and 11.5m star, 184°:54″.

1894.88	245°7	6″34	1*n*	Ho

[Ho (2977, 3558)...]

(See p. 1061)

51 58 **1507.** **β 741.** (AC = **S** 423.) The duplicity of the principal star of South's wide pair was discovered with the 6-inch. The measures show decided motion in angle and distance.

	A and B			
1879.69	158°2	0″57	4*n*	β
1891.77	165.6	1.26	3*n*	β
1898.69	167.4	1.39	2*n*	β
1902.94	167.1	1.48	3*n*	Scott
	AB and C (= S 423)			
1851.04	221°4	27″70	2*n*	WJ
1879.69	221.4	27.80	2*n*	β
1891.77	221.1	28.04	3*n*	β
1898.69	222.1	28.11	2*n*	β

[β (**XI**)...β^2...β (3114) (*Pub. L. O.* **I, II**)...Scott (*Mon. Not.* **LXIV**, 52)...]

There has been no change in the position of the distant star. The principal measures are given above. The following references relate to the wide pair:

[Dun...J^2...P^1...H (**IV, VIII**)...WJ...Glasenapp (**II**)...Cin^4...Cin^5...Wilson (Cin^{10})...]

52 0 **1508.** **β 525.** Discovered with the 26-inch at the Naval Observatory. An interesting binary near ε *Arietis*. The *Berlin Catalogue* gives the proper motion of this star, 0″062 in the direction of 130°0. The distance is decreasing, and more rapid change in the angle may be expected. Some of the later measures are:

1877.72	105°1	0″59	1*n*	β
1883.30	100.2	0.26	8*n*	En
1886.16	109.0	0.45	2*n*	HΣ
1889.37	107.4	0.45	8*n*	T
1890.58	124.6	0.3±	9*n*	Sp
1891.30	121.7	0.31	6*n*	β
1897.28	133.5	0.31	7*n*	Lewis
1898.80	134.5	0.32	3*n*	Hu
1903.33	129.0	0.28	3*n*	Lewis

[β (**X**)...β^1...β^2...β (3048, 3114) (*Pub. L. O.* **II**)...En (2678)...T (2991, 3186)...Big...Sp (**III**)...HΣ (**XII**)...Hu (*Bul. L. O.* No. 44)...Doolittle (*A. J.* 547)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...]

(See p. 1061)

52 16: **1509.** **H 5455.** "Place very precarious; ill observed." On one occasion in 1876 I could not find this pair in or anywhere near the assigned place. It was again looked for in 1903 without success (β^6).

52 18 **1510.** **Σ 331.** (= **S** 422.) Fixed.

1866.03	85°0	12″25	3*n*	Δ
1900.02	85.7	11.89	2*n*	Es

[Ma (*F. S.* **I**)... H (**V**)... Da^2...Wr... Ra (**XXIII**)...Bl (**V**)... Δ (1204)... Δ (**I, II**)... β^2... Glasenapp (**II, III**)... *Annals Toulouse Obsy.* **III**... Espin (*Mon. Not.* **LXII**, 528)...]

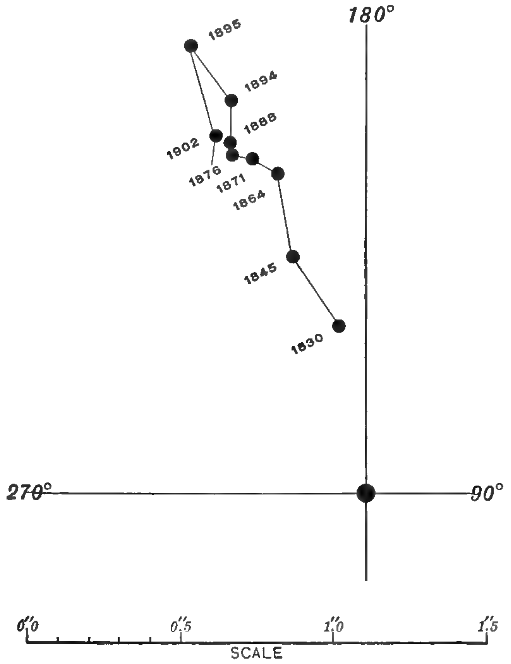
(See p. 1061)

1511. **A 208.** Aitken finds that SD (2°) 528, which is 2½′ distant in 282°, is also double: 52m 19s

1902.03	52°4	2″37	1*n*	A	9.7...13.0

[A (3784) (*Bul. L. O.* No. 16)...]

1512. ε *Arietis.* **Σ 333.** Binary. The angular motion is very slow, the change being principally in distance. It is still uncertain whether the maximum separation has been reached. The apparent orbit is evidently very elongated. The system has a proper motion of 0″035 in 260°3 (*A. G. Berlin*). 52 21



ϵ Arietis. Σ 333

1830.16	188°9	0″55	4*n*	Σ
1845.63	197.0	0.80	8*n*	OΣ
1864.01	195.3	1.07	7*n*	Δ
1871.80	198.7	1.14	4*n*	Δ
1876.08	201.6	1.17	4*n*	Hl
1888.05	201.1	1.23	3*n*	Hl
1894.44	199.0	1.34	2*n*	Com
1895.93	201.6	1.55	3*n*	Collins
1902.89	203.0	1.25	9*n*	Gr. Obsy.

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...Fl...Se (1017)...Se...Se^2...Se^3...Se (*Comp. Rend.* **XLVIII**, 375)...Bp...Da...Da^3. Wr ..Mh...WJ^2...Du...Ba (**II, III**)...H (**V**)...WS...WS^2...Δ (1013, 1109, 1209, 1250, 1473, 1886)...Δ (**I, II**)...En (1673, 2663)...Δ (*Mem. Accad. Sci.*)...Gl...Hd...Do (2196) (*Trans R. I. Acad.* **XXIX**, Part 13).... Sk.... Je (2329).... OΣ (**IX**).... Bru...Bru^2....Sp (2132)....Sp (**II**)....Lv^1....Kustner (2584)....Hayn (3051)....Per...Per (2684)...Big...β^1...β^2...Hl (**I, II**)...Perry (*Eng. Mech.* **XXXIX**, 11)...T (2866)...Giacomelli (**I**)... Knorre (*Beob. Berlin* 1892)... Maw (**I**)... Glasenapp (**II**)... Ho (3234)... Holmes (*Brit. Ast. Ass'n* **V**, 78)... Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....Com (*Pub. Washburn Obsy.* **X**)... Knorre (3300, 3518) ... Ebell (3321) ... Morgan (*A. J.* 439)... Solá (3497) ... Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...Sk^5...Do (3680, 3798)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 495; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...]

52^m 30^s **1513.** **H** 3543. Identified in Cord. DM as given, and measured:

AB	1901.87	264°2	9″89	1*n*	β	10.0...11.3
AC	1901.87	69.5	14.39	1*n*	β	...12

[H (VII)...β^5...]

52 45 **1516.** **Ho** 13. The only later measure is:

1892.01	161°1	1″73	1*n*	Ho

[Ho (2778, 3234)...]

(See p. 1061)

53 1 **1517.** **Σ** 334. Very slow motion in angle.

1866.41	319°0	1″52	3*n*	*Δ*
1900.67	316.9	1.40	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...Se...Se^3...*Δ* (1118)...*Δ* (**I, II**)...Sk^3...Lv^1... LM...Pt...Cin^6...Cin (2201)...Per...Per (2748)... T (2991)...OΣ (**IX**)... Wilson (Cin^{10}).... Giacomelli (**I**)....*Proc. Haverford Coll. Obsy.* 1892.... Collins (*A. J.* 398)...*A. G. Leipzig*, p. 246... HΣ (**XII**)...Sk^5...β^5...]

53 9 **1521.** **Σ** 327 *rej.* From *Catalogus Novus.* The principal star is 5.5 m in DM, and has a proper motion of 0″054 in 270° (Bossert). The only measures are:

1904.84	281°6	24″64	2*n*	β^6	...10.7

53 18 **1522.** **Σ** 319 *rej.* From *Catalogus Novus.* H (V) 303°3: 16″±: 9...11 (1830+) *yellow: blue.* In DM 8.5 m. No other measures except the following:

1904.85	301°0	18″52	2*n*	β^6	8.5...10.8

53 38 **1524.** **A** 209. Discovered at Mt. Hamilton. No other measures.

[*Δ* (3784)(*Bul. L. O.* No. 16)...]

53 43 **1525.** **A. G.** 60. Double in *A. G. Leipzig.* Measures by Kustner.

1903.21	159°2	5″14	2*n*	Cogshall

[Kustner (3821)...]

53 47 **1526.** **OΣ** 49. This is 50 *Arietis* in B. A. C. Change is doubtful.

1843.97	64°9	1″16	2*n*	Ma
1867.62	65.9	1.74	4*n*	*Δ*
1880.06	68.1	1.56	1*n*	β
1883.27	67.2	2.12	6*n*	En
1898.74	59.9	1.76	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)... En (2678)...*Δ* (**I**)... Sk^3...β^3...Hu (*Pub. L. O.* **V**)...]

53 48 **1527.** **A** 455. (AC = **H** 3545.) The close star discovered by Aitken. The only later measure of the H companion is:

1903.79	66°8	43″86	1*n*	A

[A (*Bul. L. O.* No. 50)...]

1528. **Kr** 17. Noted as double in *A. G. Hels.* 53^m 54^s

1898.63	221°5	3″46	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

1529. **H** 2166. "8.9 very ruddy; a very regular rhomboid." In measuring these stars, I have added a faint companion to one. 54 4

AB	1903.92	248°7	59″39	2*n*	β^6	7.5... 9.3
AC	1903.92	192.2	60.25	2*n*	β^6	... 9.4
AD	1903.92	139.9	64.19	2*n*	β^6	... 9.7
C*c*	1903.92	339.2	7.35	2*n*	β^6	...13.2

1530. *Persei* 104. **Σ** 336. (= **H** 330.) **B. A. C.** 936. Later measures make the distance a little larger, but there is probably no change. 54 8

1868.64	7°6	8″50	4*n*	*Δ*
1883.88	7.5	8.66	4*n*	Per
1889.70	7.4	8.30	5*n*	Giac
1902.91	8.3	8.48	4*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...WJ^2...Ra (**XXIII**)...Se...OΣ (**IX**)...*Δ* (1185) ...*Δ* (**I, II**)...Sk^3...Per...Per (2684)... Giacomelli (**I**)... Glasenapp (**II**)... Do (3930)...]

1533. **Hu** 811. The R. A. should be 2^h 52^m 24^s. 54 24

(See p. 1061)

1534. **Σ** 337. Unchanged. 54 29

1865.96	162°7	17″45	3*n*	*Δ*
1880.54	162.7	17.44	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...β^3...T (3185)...]

1535. **Σ** 335. Probably a little change in distance. 54 42

1866.83	158°7	23″85	3*n*	*Δ*
1881.67	159.5	23.62	3*n*	β
1904.77	159.4	23.27	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...β^4...β^6...]

1537. **Σ** 338. Fixed. 55 18

1866.13	200°8	20″01	3*n*	*Δ*
1889.67	200.1	20.23	4*n*	Toulouse

[Ma (*F. S.* **I**)...Ma (**X**)...En...*Δ* (**II**)...*A. G. Leipzig*, p. 206...*Annals Toulouse Obsy.* **III**)...]

1539. **H** 2169. (= **Espin** 10.) The only measures are: 55 25

1900.22	311°9	8″51	4*n*	Espin (3717)

1541. **Hd** 62. Measured at the Kirkwood Observatory: 55 42

1903.84	120°2	39″89	1*n*	Duncan

$56^m\ 6^s$ **1544.** *γ Persei.* **H 2170.** (= σ 88.) There is an error of 100° in Herschel's angle. The only measures are:

1879.55	323°.7	57″.72	2*n*	β	...10.8
1900.73	324.9	57.44	3*n*	β	...11.2

[β^3...Sadler (*Mon. Not.* **XXXIX**, 185)...β^5...]

56 30 **1546.** **H 2168.** Herschel called A "very red." I found it not red in 1904. The principal star is DM (70°) 226.

1904.84	293°.8	17″.14	2*n*	β^6	9.2...11.2

56 30 **1547.** **Kr 18.** Noted as double in *A. G. Hels.* No other measures.

[β (3042) (*Pub. L. O.* **II**...]

56 48 **1548.** **Σ 339.** Probably unchanged. The principal star is DM (27°) 471.

1866.70	328°.4	13″.51	3*n*	Δ
1904.84	328°.1	13″.39	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H (**IV**)...Δ (**II**)...HΣ (**XII**)...β^6...]

56 49 **1549.** *ρ² Eridani.* **β 11.** Discovered with the 6-inch. There appears to be no sensible change in either angle or distance. This star has no appreciable proper motion.

1879.95	85°.1	2″.47	3*n*	β
1886.82	81.8	2.72	2*n*	LM
1887.88	86.5	2.49	2*n*	T
1888.86	85.0	2.47	2*n*	T
1898.83	83.8	2.41	3*n*	Cg

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β^3... Δ (**I**)... Δ (2081)... Cin^4... Wilson (Cin^{10}) ... LM ... Lv^1 ... Tarrant (2899, 2991)... Collins (*Proc. Haverford Coll. Obsy.* 1891)...Cogshall (*A. J.* 478)...]

56 57 **1550.** **Σ 341.** Without change.

1866.78	228°.0	8″.57	3*n*	Δ
1876.69	227.1	8.59	3*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...OΣ (**IX**)...Cin^4...Cin^6...]

57 21 **1551.** **H 2171.** Herschel's estimated distance much too small, and both stars too faint. They make the 9.5 m star, DM (42°) 694.

1904.84	319°.8	9″.15	2*n*	β^6	9.6...9.8

57 34 **1553.** **Arg. 10.** Noted "duplex" in *O. Arg. N.*

[Espin (3717)...β^5...]

57 46 **1554.** **β 1174.** Discovered with the 12-inch. The principal star has a considerable proper motion:

Rad^3.	0″.163 in 169°.6
Porter	0.201 in 178.3

The later measures are sufficient to show that this is a physical system, since the two stars are moving together.

1898.69	298°.9	1″.21	1*n*	β	8.0...12.0

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

1555. **β 1175.** Discovered with the 36-inch. The only later measure is: $57^m\ 49^s$

1900.76	279°.7	0″.21	1*n*	A

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...A (*Bul. L. O.* No. 11)...]

1556. **Σ 342.** Without change. 57 57

1866.46	305°.4	3″.01	3*n*	Δ
1904.84	306.0	3.00	2*n*	β

[Ma (*F. S.* I)...Ma (**X, XIII**)...H (**IV**)...Se...Δ (**II**)...β^6...]

1557. **Lewis 3.** Approximate place (*Mon. Not.* LXII, 385). It should be in the field with, or very near, 52 *Arietis* (No. 1559), but in measuring the latter, I failed to find the Lewis pair in the immediate vicinity. 58 :

1558. **H 3548.** The principal star has a considerable proper motion: 58 21

Stumpe	0″.255 in 104°.8
Porter	0.240 in 105.7

The companion is moving with it. The following are all the measures:

1877.60	122°.8	12″.49	2*n*	Cin	7.0...11.0
1896.98	120.4	11.36	2*n*	A	
1897.54	122.8	11.95	5*n*	Doo	

[Cin^4...A (3465)...Doolittle (*Pub. Flower Obsy.* I)...]

1559. 52 *Arietis.* **Σ 346.** Σ suspected motion in the close pair, but this is not confirmed by later measures. There is no material change in B or C in the last sixty years, as will be seen from the following: 58 24

A and B

1866.55	269°.9	0″.5 ±	4*n*	Δ
1879.12	265.9	0.6 ±	3*n*	Sp
1880.72	273.0	0.47	1*n*	β
1883.99	270.7	0.48	2*n*	Per
1888.38	270.8	0.53	2*n*	T
1901.71	271.2	0.46	11*n*	Gr. Obsy.
1903.84	271.0	0.49	3*n*	A

AB and C

1866.55	354°.9	5″.18	4*n*	Δ
1880.72	351.3	5.01	1*n*	β
1883.99	356.8	5.49	2*n*	Sp
1888.38	360.1	5.43	2*n*	T
1902.02	355.8	5.20	4*n*	Gr. Obsy.

The principal star has a proper motion of 0″.031 in 245°.6 (*A. G. Berlin*). There is a fourth star 10.8 m.

1879.82	83°.2	102″.20	3*n*	β
1904.81	82.5	102.15	2*n*	β

[Ma (*F. S.* I)...Ma (**IX, XI, XIII**)...OΣ (**IX**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Se^3...Kn...Sk^3...Sp (**II**)...Per...Per (2684)...Du...β^3...Ra (**XLVII**)...Δ (**II**)...T (2991)...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Solá (3563)...Do (3680)...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...β^6...A (   )...]

$59^{m}\ 8^{s}.5$ **1561.** **H** 5456. "Place precarious." This place is near that of DM (31°) 542. It is not that star, and I could not find any pair near like H 5456.

59 46 **1563.** **Σ** 350. Apparently fixed.

1866.14	119°.2	16″.46	3*n*	Δ
1904.81	119.0	16.20	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI**) . . . H (**V**) . . . Wn (1738) . . . Δ (**II**) . . . β6 . . .]

0 0 **1564.** **A. G.** 61. Double in *A. G. Berlin;*

1902.92	24°.7	0″.87	3*n*	Miller

[Hu (*Bul. L. O.* No. 44) . . . Miller (*A. J.* 546) . . .]

0 22 **1565.** **β** *Persei.* (*Algol.*) **β** 526. The faint stars near the well-known variable, *Algol*, were noted with the 18½-inch. No elongation of the principal star, or any close companion, could be seen with the 36-inch under favorable conditions. The large star has a small proper motion, 0″.013 in the direction of 242°.3 (Auwers). There is no possibility of these faint stars being other than optical companions. The principal star is a spectroscopic binary (Vogel, *A. N.* 2947). The later measures of the small stars are:

A and B

1891.97	155°.4	57″.48	2*n*	β
1898.96	155.4	58.79	1*n*	β
1899.82	155.3	58.24		Gr. Obsy.

A and C

1891.97	144°.3	68″.38	1*n*	β
1898.96	144.8	67.19	1*n*	β
1899.82	145.6	67.47		Gr. Obsy.

A and D

1891.97	192°.5	81″.51	2*n*	β
1898.96	192.4	81.78	1*n*	β
1899.82	192.6	81.73		Gr. Obsy.

D and E

1891.97	115°.0	11″.52	2*n*	β
1898.96	118.0	11.98	1*n*	β
1899.82	119.5	11.26		Gr. Obsy.

[β (**X**) . . . β1 . . . β3 . . . β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . Greenwich Obsy. (*Mon. Not.* **LX**, 518) . . .]

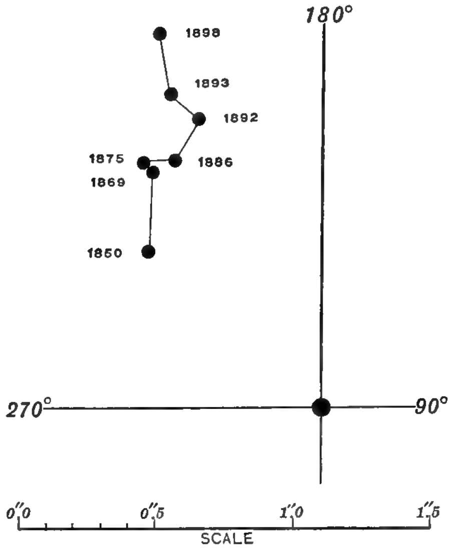
0 23 **1567.** **β** 527. Discovered with the 18½-inch; closely *sp* Σ 356.

1877.95	237°.6	0″.76	1*n*	Cin
1892.03	66.0	0.83	3*n*	β
1898.88	65.3	0.81	3*n*	Bd

[β (**X**) . . . β1 . . . β (3114) (*Pub. L. O.* **II**) . . . Cin4 . . . Boothroyd (*A. J.* 478) . . .]

(See p. 1061)

0 45 **1568.** **OΣ** 50. (AC = **H** 2172.) Close pair not mentioned by H. The agreement in places of the two stars was remarked by OΣ, but the faint star appears not to have been noticed. I found the faint star very difficult with the 6-inch. The distance of AB is increasing, the motion being apparently rectilinear. The measures by Ma (XIII) credited to this pair, belong to OΣ 51.



OΣ 50

A and B

1850.22	228°.2	0″.85	2*n*	OΣ
1869.12	215.7	1.06	5*n*	Δ
1875.33	216.1	1.11	1*n*	OΣ
1886.47	210.8	1.05	4*n*	T
1892.87	203.0	1.14	2*n*	Jones
1893.20	205.9	1.27	3*n*	Maw
1898.58	203.4	1.50	3*n*	Hu

AB and C

1900.23	296°.3	26″.96	1*n*	Hu	. . . 13.0

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Δ (**I**) . . . Do (2322, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . β (2033) . . . Flm . . . T (2866) . . . Jones (*Proc. Haverford Coll. Obsy.* 1891–92) . . . HΣ (**XII**) . . . Maw (**II**) . . . Hu (*Pub. L. O.* **V**) . . .]

1569. **A. G.** 62. Double in *A. G. Lund.* Measures by β6. $0^{m}\ 45^{s}$

1570. **Σ** 349. Unchanged. 0 45

1868.65	320°.9	6″.12	4*n*	Δ
1892.95	319.6	5.72	2*n*	Gla

[Ma (*F. S.* I) . . . Ma (**XI**) . . . H1 . . . Bp . . . Ra (**XXIII**) . . . Wr . . . Se . . . Ba (**II**) . . . Δ (1118) . . . Δ (**I, II**) . . . Seagrave (*Sid. Mess.* **II**, 274) . . . Glasenapp (**II**) . . .]

1571. **Σ** 353 *rej.* Measures by β5. No other observations except an angle of 65°.4 by H (VI). 0 47

1572. **Σ** 355. Without motion. 0 54

1868.03	146°.8	2″.68	4*n*	Δ
1903.03	147.0	2.36	2*n*	Do

[Ma (*F. S.* **I**) . . . Ma (**X, XI**) . . . Se . . . Hl (**I, II**) . . . Flm . . . Pt . . . Lv1 . . . Δ (**II**) . . . Do (2989, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . β1 . . . Cin6 . . . Hl (*Wash. Obsns.* 1885) . . . Hl (**I, II**) . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Big (*Bul. Ast.* **XII**, 299) . . . Sk . . . Sk5 . . .]

$1^m\ 0^s$ **1573. Σ 356.** Unchanged.

1868.51	13°5	15″62	4*n*	Δ
1904.74	13.7	15.61	2*n*	β

[Ma (*F. S.* I) . . . Ma (XI) . . . H (VIII) . . . Δ (II) . . . β^1 . . . Cin^4 . . . Wilson (Cin^{10}) . . . β^6 . . .]

1 2 **1574. Σ 351.** Probably fixed.

1868.51	118°0	27″16	4*n*	Δ
1879.83	118.3	26.97	2*n*	β
1904.83	117.1	27.07	2*n*	β

[Δ (II) . . . β^3 . . . β^6 . . .]

1 4 **1575. Σ 354** *rej.* From *Catalogus Novus*. *A. G. Berlin* gives this star a proper motion of 0″096 in 238°7. The only measures are:

1904.63 53°3 34″17 2*n* β^6 8.6 . . . 9.4

1 7 **1576. Σ 345.** Fixed.

1868.28	81°8	6″65	4*n*	Δ
1904.79	82.2	6.72	2*n*	β

[Ma (*F. S.* I) . . . . Ma (XI, XII. XV) . . . . H (V) . . . . Gl . . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Δ (II) . . . β^6 . . .].

(See p. 1061)

1 14 **1577. Σ 352.** So far without change.

1870.43	1°9	3″57	6*n*	Δ
1880.13	2.2	3.50	2*n*	β
1904.80	2.8	3.44	2*n*	β

[Ma (*F. S.* I) . . . H (VII) . . . Δ (II) . . . β^3 . . . β^6 . . .]

2 17 **1579. H 2173.** The only measure is:

1904.61 162°7 46″96 2*n* β^6 7.1 . . . 11.0

(See p. 1061)

2 25 **1580. β 528.** Discovered with the 18½-inch. In the field with Σ 358. Apparently unchanged.

1886.84	12°5	0″91	1*n*	LM	8.2 . . . 8.3
1889.02	197.3	. . . .	1*n*	Lv	8.5 . . . 8.6
1898.82	197.6	0.95	3*n*	Cg	8.8 . . . 8.8
1900.04	13.4	0.72	3*n*	A	8.5 . . . 8.8

[β (X) . . . . β^1 . . . . LM . . . . Lv^1 . . . . Collins (*Proc. Haverford Coll. Obsy.* 1891) . . . . Cogshall (*A. J.* 478) . . . A (*Bul. L. O.* No. 11) . . .]

2 33 **1581. Σ 357.** No material change.

1866.80	295°1	8″04	3*n*	Δ
1879.45	295.7	8.47	4*n*	β
1888.03	297.6	8.52	1*n*	Lv
1896.17	295.2	7.96	4*n*	A

[H (VIII) . . . Ma (XI) . . . Ma (*F. S.* I) . . . Δ (II) . . . β^3 . . . Lv^1 . . . A (3395) . . .]

1582. Σ 358. Change doubtful. $2^m\ 44^s$

1868.55	349°9	14″82	4*n*	Δ
1877.95	350.3	14.39	1*n*	β
1896.16	347.9	15.42	3*n*	A
1899.84	347.8	14.95	3*n*	Doo

[Ma (*F. S.* I) . . . H (VIII) . . . Δ (II) . . . β^1 . . . Cin^6 . . . A (3395) . . . Doolittle (*Pub. Flower Obsy.* I) . . .)

1583. *Ceti* 499. **Σ 6, App. I.** (= **Sh** 37 = **OΣ (App)** 32.) 2 47
Relatively fixed.

1870.54	162°7	81″18	8*n*	Δ
1878.90	162.8	81.14	6*n*	Je
1892.99	162.5	81.47	2*n*	Gla

[En . . . Ra (XXVI) . . . Δ (II) . . . Je (2329) . . . Schur (2255) . . . Glasenapp (II) . . .]

1584. β 1030. Discovered with the 36-inch. The measures taken together do not indicate any sensible motion. 3 12

1890.64	168°9	0″5 ±	10*n*	Sp
1896.78	163.1	0.57	6*n*	Lewis
1897.93	160.9	0.76	3*n*	A
1901.76	159.3	0.53	8*n*	Gr. Obsy.

[β (XIV) . . . . β (2875) (*Pub. L. O.* II) . . . . Sp (III) . . . . A (*A. J.* 429) . . . . Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403) . . .]

1588. Glasenapp 1. Discovered by Glasenapp, but the declination is 1° too small in both of his lists. Identified and measured. One or both of these stars supposed to be variable. 4 8

1903.85 87°6 3″79 3*n* β 9.6 . . . 9.6

[Glasenapp (II, IV) . . . β^6 . . .]

1590. ♅ V. 117. (= **Σ** 359 *rej.*) The large star has a proper motion of 0″113 in 165°8. The only observation since ♅ is: 4 17

1900.73 320°3 32″99 2*n* β^5 7.5 . . . 8.5

There is a 13m star nearer A, 267°0 : 14″69 (1900.72) 1*n*.

1592. Σ 344. Probably unchanged. 4 23

1866.44	144°6	2″51	3*n*	Δ
1904.79	143.8	2.22	2*n*	β

[Ma (*F. S.* I) . . . Ma (XI, XII) . . . Δ (II) . . . Gl . . . β^6 . . .]

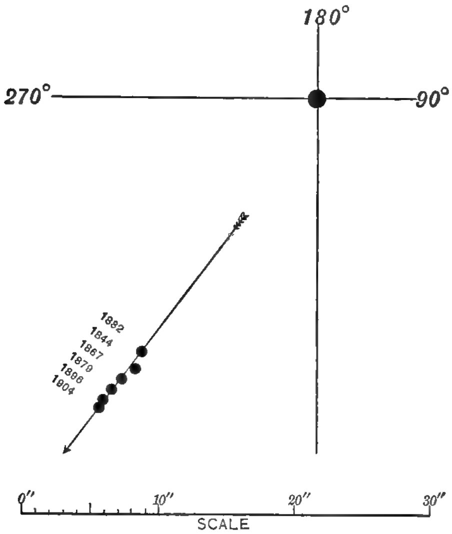
1593. Hu 605. From *Bul. L. O.* No. 57. 4 31

1594. Σ 360. Perhaps a little change in angle, with increasing distance. 4 32

1847.22	143°0	1″60	3*n*	OΣ
1869.38	139.1	1.67	5*n*	Δ
1882.11	138.0	1.68	3*n*	Je
1888.97	137.2	1.82	3*n*	Hl
1892.98	139.6	1.75	2*n*	Gla

[Ma (*F. S.* I) . . . Ma (XI) . . . Δ (1118, 2194) . . . Δ (I, II) . . . OΣ (IX) . . . Flm . . . Sk . . . Hl (*Wash. Obsns.* 1885) . . . Hl (I, II) . . . Je (2449) . . . Se . . . En (2663) . . . Per . . . Per (2684) . . . Glasenapp (II) . . . HΣ (XII) . . . Sk^5 . . .]

4m 38s **1595.** **Σ 343.** One of the components has an annual proper motion of 0″.068 very nearly in the direction of the line joining the two stars. At one time they formed a close pair.



Σ 343

1832.59	325°.4	22″.66	3*n*	Σ
1844.33	326.1	23.80	1*n*	Ma
1867.33	325.2	25.03	4*n*	Δ
1879.06	324.7	26.09	1*n*	Do
1896.33	324.6	27.09	3*n*	A
1904.79	324.8	27.57	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....Δ (**II**)....Flm....Seagrave (*Sid. Mess.* **II**, 22)....β (*Mon. Not.* **XXXIV**, 371)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...A (3395)...β6...]

4 42 **1596.** **Σ 361.** Fixed.

1866.97	13°.5	9″.98	3*n*	Δ
1904.80	13.1	10.22	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β3...β6...]

4 52 **1597.** **Ho 501.** The later measures show very decided change in distance.

1904.41	205°.3	9″.51	3*n*	β

[Ho (3557)...β6...] (See p. 1061)

4 53 **1598.** **OΣ 51.** No material change. The measure in Ma (XIII) is credited to OΣ 50.

1870.55	303°.2	1″.29	5*n*	Δ
1898.15	306.9	1.24	5*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...β (2033)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

4 57 **1599.** **O. Stone 6.** Discovered at the Cincinnati Observatory.

1886.69	178°.5	4″.72	2*n*	LM	9.7...10.0

[Cin3...LM...]

1600. **H 2175.** The only later measures are: 5m 7s

1900.47	23°.6	12″.38	2*n*	Espin (3717)

1601. *Cephei* 48 (Hev.) **β 1176.** Discovered with the 36-inch. The close pair is difficult. The principal star (B. A. C. 979) has a proper motion, according to Auwers, of 0″.073 in the direction of 137°.5. The later measures show that the close star is moving with the large star, while the distant companion probably has no proper motion. 5 9

A and B

1899.65	268°.1	1″.22	1*n*	A
1899.82	275.7	1.25	2*n*	Barnard

A and C

1899.65	232°.7	10″.89	1*n*	A
1899.81	232.4	11.06	3*n*	Barnard

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...A (3638)...]

1602. *Eridani* 103. **β 400.** Discovered with the 6-inch. This is a naked-eye star, Heis 6 m (= Lalande 5925 = W1 IIIh. 50). Apparently fixed. 5 18

1891.96	54°.1	22″.74	2*n*	β
1898.71	53.7	22.61	2*n*	β
1899.76	52.8	23.00	8*n*	Doo

[β (**VII**)...β (2103)...β1...β3...β (3114) (*Pub. L. O.* **II**)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...]

1605. **Σ 364.** Fixed.

1865.59	311°.3	11″.41	3*n*	Δ
1895.92	310.4	11.68	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H2...Δ (**II**)...Glasenapp (**IV**)...]

1606. **A. G. 63.** Double in *A. G. Lund.* Measures by β6. 6 7

1608. 94 *Ceti.* **H 663.** No material change, but the stars have a common proper motion, and probably make a physical system. 6 39

Bossert	0″.193 in 111°.2
A. G. Nico.	0.198 in 111.6

The following are all the measures:

1871.01	253°.1	5″.09	2*n*	Δ	...11.5
1877.70	250.9	5.73	1*n*	β	
1888.99	249.2	5.68	2*n*	T	
1896.19	249.8	4.60	2*n*	A	
1904.73	249.3	4.41	3*n*	β	

[Δ (**I**)...Sadler (*Ast. Reg.* **XXIII**, 117)...β1...β2...T (2991)...A (3395)...β6...]

1609. **H 3554.** The only later observation is: 6 42

1879.66	347°.6	20″.04	1*n*	Cin6	8.0...11.0

(See p. 1061)

6m 43s **1610.** **Σ 362.** D was added by *Δ*. No change in AB or AD. Other stars in the field. C from Glasenapp; not in Σ.

AB	1904.76	142°5	7″04	*2n*	*β*
AC	1904.76	43.6	26.15	*1n*	*β*
AD	1904.76	241.8	34.86	*1n*	*β*

There is a small star nearer than D in the direction of 105°3.

[Ma (*F. S.* I)... Wr... Se... Bp... H^2... Da... Ra (**XXIII**)... Bl (V)... *Δ* (1204, 1735)... *Δ* (I, II)... Glasenapp (II)... *Annals Toulouse Obsy.* **III**... β^6...]

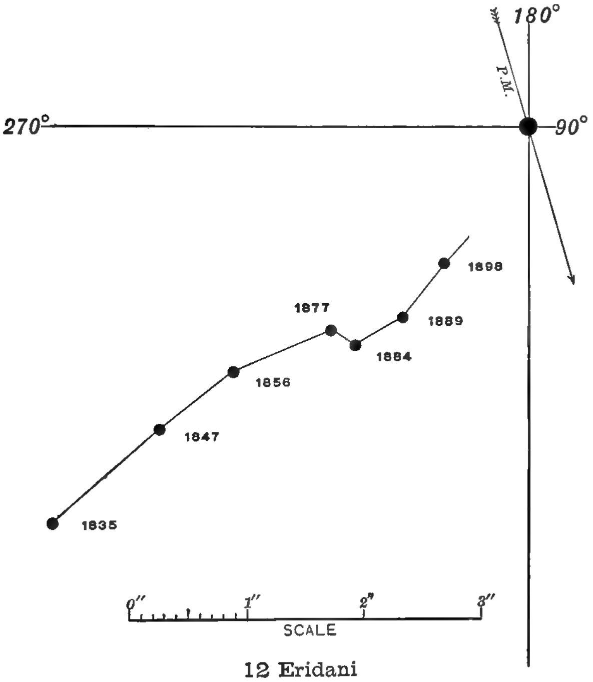
6 50 **1611.** **Σ 365** *rej.* Description from *Catalogus Novus*, but the place there is erroneous. Identified and measured:

1904.03	143°0	13″11	*2n*	β^6	9.4...9.7

6 58 **1612.** 12 *Eridani*, **H** 3555. The principal star has a large proper motion:

Stumpe	0″732 in 25°9
Bossert	0.730 in 25.4

The apparent motion of the companion is rectilinear. If the change is due to proper motion, the small star has nearly the same motion in space as the other, but in a different direction: It is probable, however, that the companion is moving in a very elongated ellipse.



12 Eridani

Some of the measures are:

1835.86	310°0	5″30	*3n*	H
1847.00	309.6	4.09		J
1856.16	309.9	3.31	*4n*	J
1877.81	316.0	2.44	*3n*	Cin
1884.87	321.8	2.40	*2n*	Wilson
1889.04	326.6	1.97	*2n*	Hl
1898.95	329.0	1.38	*2n*	A

[H^3... J^2... J^3... WJ^2... β^2... Hl (*Wash. Obsns.* 1880)... Hl (I, II)... Cin^4... P^1... Flm... Wilson (Cin^{10})... Pollock (*Mem. R. A. S.* **L**, 63) (*Sydney Obsy. Pub.* 1891)... Sp (II)... Tebbutt (*Mon. Not.* **XLVI**, 50)... Do (3378)... Scott (*Brit. Ast. Ass'n* **VI**, 248) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)... See (3495)... A (3584)... Solá (3679)... Doolittle (*Pub. Flower Obsy.* **I**)...]

1614. **OΣ 52.** Probably binary, as the components have the same proper motion, but the change is slow. The proper motion is given: 7m 3s

A. G. Chris.	0″032 in 277°6
Schroeter	0.018 in 293.2

1859.72	145°3	0″59	*2n*	OΣ
1868.74	136.8	0.5 ±	*5n*	*Δ*
1878.84	136.2	0.44	*1n*	*β*
1889.80	125.0	0.43	*2n*	HΣ
1898.16	119.1	0.64	*4n*	Hu
1901.01	117.1	0.73	*3n*	Doo

[Ma (**XI**)... OΣ (**IX**)... *Δ* (**I**)... Do (2322)... Flm... β^3... Jones (*Proc. Haverford Coll. Obsy.* 1892)... Glasenapp (**II**)... Sp (**III**)... HΣ (**XII**)... Big (*Bul. Ast.* **XII**, 299).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**).... Hu (*Pub. L. O.* **V**)... Biesbroeck...]

1617. *Arietis* 161. **β** 530. (AB = **Σ** 366 *rej.*) The distant companion of this rejected pair of Σ was found to be double with the 18½-inch. Thus far the measures indicate no change. Lalande 5961. The bright star is given a proper motion of 0″055 in 90° (*A. G. Berlin*). The following are all the measures of AB: 7 18

B and C

1892.00	194°2	1″70	*3n*	*β*
1896.85	.....	1.68	*1n*	Bow
1898.75	194.0	1.66	*2n*	*β*
1899.43	192.3	1.92	*5n*	Lewis

A and B (= Σ 366 *rej.*)

1892.00	40°9	48″40	*2n*	*β*
1898.75	40.8	48.08	*2n*	*β*

[*β* (**X**)... β^1... *β* (3114) (*Pub. L. O.* **II**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIV**, 791)...]

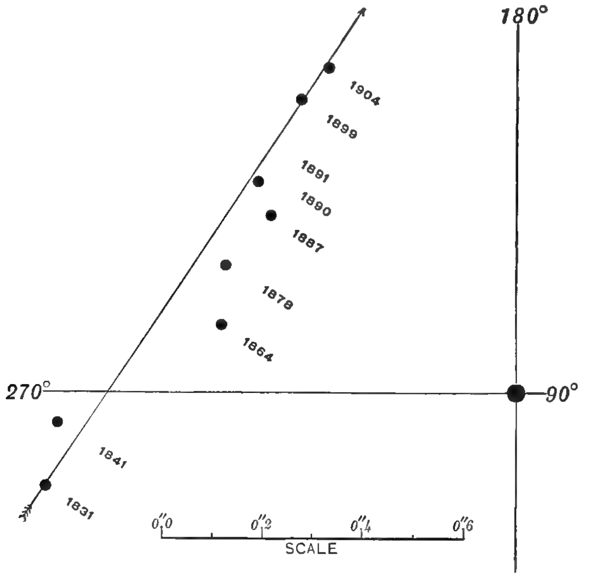
1621. **See** 22. Discovered at the Lowell Observatory. 7 36

1899.71	340°3	1″13	*2n*	Cg

[See (*A. J.* 431)... Cogshall (*A. J.* 505)... Innes (*Mon. Not.* **LXII**, 473)...]

1622. **A. G. 64.** Double in *A. G. Lund.* Measures by β^6. 7 49

1623. **Σ 367.** The apparent motion is practically and almost perfectly rectilinear, although it is not unlikely that it will in the future prove to be a physical pair. The apparent change in the position of the companion is 0″014 7 52 annually in the direction of about 146°. Glasenapp, from the observations to 1898, finds an orbit with a period of 224.0 years.



Σ 367

1831.72	281°.4	0″.95	3*n*	Σ
1841.70	273.9	0.91	1*n*	OΣ
1864.29	256.8	0.60	7*n*	Δ
1878.98	246.2	0.63	2*n*	β
1887.55	234.0	0.60	2*n*	Sp
1890.10	230.7	0.66	2*n*	T
1891.15	226.6	0.73	2*n*	Big
1899.81	216.1	0.72	4*n*	Doo
1904.46	210.2	0.64	3*n*	β

[Ma (*F. S.* **I**)...Ma (**IX, XI**)...OΣ (**IX**)...Se...Se (*Comp. Rend.* **XLVIII**, 375) En (1673)...WS^{2}...Flm...Do (2307)...Hl (**I, II**)...Sp (**II**)...Sp (**II**, App.) Lv^{1}...Wilson (Cin^{10})...Δ (1473)...Δ (**II**)...T (3185)...β^{3}...Big (*Bul. Ast.* **XII**, 299)... Collins (*A. J.* 378)... HΣ (**XII**)...Solá (3563) ... Doolittle (*Pub. Flower Obsy.* **I**)...Glasenapp (3669) orbit...Biesbroeck...β^{6}...]

(See p. 1061)

8^{m} 9^{s} **1624.** **β 529.** Discovered with the 18½-inch. Probably unchanged.

1891.86	222°.4	3″.11	2*n*	β
1898.76	222.4	2.94	1*n*	β
1898.82	220.7	3.50	2*n*	Cg
1899.89	221.0	3.10	4*n*	Doo

[β (**X**)...β^{1}...β (3114) (*Pub. L. O.* **II**)...Cogshall (*A. J.* 478)... Doolittle (*Pub Flower Obsy.* **I**)...]

8 12 **1625.** **Weymouth.** Discovered by Weymouth at the Lick Observatory in observing a comet. Measures by Aitken (*Bul. L. O.* No. 25).

8 22 **1626.** **H 332.** "Quadruple, if two other very small stars be regarded, one about 330°, and the other 135°."

AB	1903.38	108°.6	32″.03	3*n*	β^{6}	6.8...13.3
AC	1903.26	10.3	45.20	2*n*	β^{6}	...13.0

There is a more distant 12 m star in 136°.5.

1628. **H 1133.** H (V) 203°.7 (1830+); his last R. A. correct. The large star has a small proper motion: 8^{m} 35^{s}

Battermann	0″.019 in 139°.8
Schroeter	0.022 in 140.9

The only measures are:

1896.35	202°.5	30″.58	3*n*	A

[H (**V**)...*Mon. Not.* **LI**, 398 (proper motion)...A (3395)...]

(See p. 1061)

1629. **Σ 363.** (= **H 2177**.) Fixed. 8 45

1868.21	312°.9	26″.26	4*n*	Δ
1904.83	313.6	26.31	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^{6}...]

1630. **Σ 370.** Probably fixed. 9 11

1867.01	314°.7	17″.09	3*n*	Δ
1904.80	316.2	16.82	2*n*	β

[Ma (*F. S.* **II**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

1631. **H 3557.** The Decl. in H is 1° farther north. There being no bright star in that place, a search was made, and it was found as given here. The only measures are: 9 12

1880.27	5°.3	27″.13	3*n*	β	8.0...11.1
1900.72	2.3	26.95	2*n*	β	8.0...10.9

[β^{3}...β (*Observatory*, **IV**, 53)...β^{6}...]

1633. **Σ 369.** No motion. 9 21

1868.48	28°.4	3″.35	4*n*	Δ
1892.98	28.5	3.31	2*n*	Gla

[H^{1}...Ma (*F. S.* **I**)...Ma (**XI**)...Bp...Wr...Se...Ba (**II, III**)...Ra (**XXIV**)... Da^{2}...Da^{3}...Seagrave (*Sid. Mess.* **II**, 274)...Δ (**I, II**)...Δ (1118)...Glasenapp (**II**) ...]

1639. **OΣ 53.** Probably binary, but the angular motion so far is very slow. No sensible change in the distance. 9 59

1868.18	261°.5	0″.88	4*n*	Δ
1874.02	257.9	0.82	5*n*	Δ
1883.74	254.6	0.86	6*n*	En
1883.93	252.2	0.69	2*n*	Per
1893.82	244.3	0.53	3*n*	Com
1898.13	238.4	0.79	3*n*	Hu
1903.69	229.5	0.61	4*n*	Gr. Obsy

[Ma (**XI, XIII**)....OΣ (**IX**)....Do (2330)....Sk^{3}...Δ (**I**)....En (2678)....Per.... Per (2684)....Flm....Big (*Bul. Ast.* **XII**, 299)....Sk^{4}....Sk^{5}....Com (*Pub. Washburn Obsy.* **X**)...Morgan (*A. J.* 439)...Ho (3558)...Hu (*Pub. L. O.* **V**) ...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...]

1640. **β 84.** Discovered with the 6-inch. This is a naked-eye star in *Cetus;* Argelander and Heis, 6 m. While the measures are somewhat discordant for so easy a pair, 10 5 they do not point to any sensible change. Some of the later measures are:

1879.39	32°.4	0″.72	5*n*	β
1886.71	27.1	0.76	3*n*	LM
1888.52	22.4	0.51	4*n*	T
1888.94	21.5	0.58	2*n*	Lv
1889.52	26.0	0.66	5*n*	Sp
1890.89	27.3	0.73	4*n*	β
1897.05	21.4	0.87	1*n*	A
1903.83	22.8	0.72	2*n*	A

[β (**II**) ... β (*Mon. Not.* **XXXIII**, 437) ... β2 ... β3 ... β (3048) (*Pub. L. O.* **II**) ... Δ (**I**) ... Δ (2081) ... Cin4 ... Cin6 ... LM ... Lv1 ... T (2991) ... Glasenapp (**II**) ... Sp (**III**) ... A (3465) ... Bryant (*Mon. Not.* **LIX**, 400; **LXI**, 383) ... Solá (3679) ... Doolittle (*A. J.* 547) ...]

$10^m\ 23^s$ **1641.** Σ 371. Probably unchanged. The angle in Struve seems to be too small.

1867.45	81°.7	3″.32	3*n*	⅃
1883.44	84.6	3.47	5*n*	En
1897.56	81.7	3.35	5*n*	Doo
1900.76	81.9	3.40	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... ⅃ (**II**) ... Flm ... Cin6 ... En (2663) ... Doolittle (*Pub. Flower Obsy.* **I**) ... β5 ...]

10 30 **1642.** Σ 368. Relatively fixed; but the stars have a common proper motion of 0″.152 in 155°.0 (Schroeter).

1866.83	162°.5	2″.41	3*n*	Δ
1904.62	161.6	2.13	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Δ (**II**) ... β6 ...]

11 0 **1644.** β 1039. Discovered with the 36-inch. The only later measure is:

1898.92	208°.2	2″.43	1*n*	A

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... A (3584) ...]

11 4 **1646.** Σ 372. Fixed.

1869.09	290°.7	7″.32	4*n*	Δ
1904.62	291.3	7.57	2*n*	β

[H (**V**) ... Ma (*F. S.* **I**) ... Δ (**II**) ... β6 ...]

11 15 **1647.** H 3561. Identified and measured:

1903.01	146°.0	22″.98	2*n*	β6	9.2 ... 12.2

11 52 **1648.** H 3563. (= H N. 18.) Place erroneous in H.

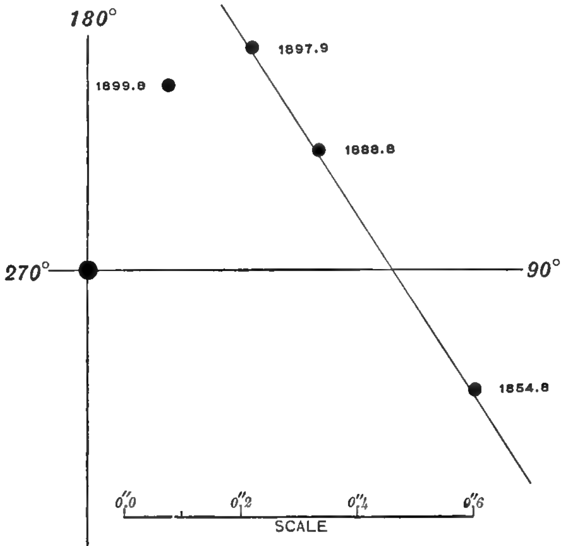
1876.12	256°.3	8″.29	9*n*	Cin	
1903.83	255.3	8.83	2*n*	β	8.8 ... 9.0

[Cin3 ... Cin4 ... Wilson (Cin10) ... β6 ...]

1650. 95 *Ceti.* A. C. 2. Discovered by Alvan Clark in 1853 with his 7½-inch refractor, and measured by Dawes the following year, who called the small star 10 m. He does not appear to have looked at it again, and for more than thirty years there is no reference to it by any observer until the negative results of 1878 were given in β3. I looked for this many times prior to that with various apertures, but until 1888 was never able to see any trace of the companion. From the *Annals of the Harvard College Observatory*, published in 1882, it appears to have been observed, but the angles are so inconsistent that it is evident that the companion could not have been seen at all, or on only one night. These observations are: $12^m\ 12^s$

1866.88	12°.9	1*n*	Searle	"Companion *n*"
1866.88	350.9	1*n*	Winlock	"Companion *n*"
1866.90	26.7	1*n*	Winlock	"Companion *f*"
1867.09	82.6	1*n*	Winlock	"Companion *np*"

These positions must necessarily all be rejected until it shall appear from other evidence which, if either, is correct.



95 Ceti

The following are the positive and negative results so far as they are given in published form:

1854.81	73°.1	0″.7 ±	3*n*	Da
1877.96	Single with 900, 18½-in.		1*n*	β
1878.85	Single, 18½-in.		2*n*	β
1881.83	Single or very doubtful, 12-in.		1*n*	β
1886.74	Single with 26-in.		2*n*	Lv
1888.77	117.8	0.45	2*n*	β
1890.88	Single with 36-in.		2*n*	β
1891.73	Single with 36-in.		1*n*	β
1897.83	148.2	0.42	1*n*	See
1897.83	147.5	0.51	1*n*	Boothroyd
1898.15	136.7	0.51	2*n*	A
1899.81	157.0	0.35	2*n*	See
1900.63	No trace of companion		1*n*	A
1900.78	155.	Suspected	1*n*	A
1901.76	Single with 2400, 36-in.		2n	A

I find an error in reducing one of my measures in 1888, so that the mean is 117°8 instead of 112°8 as originally given. It is evident from the above results that, however accurate the measures may be, they cannot possibly represent the total angular motion since 1854, as the companion should have been seen at all times with any instrument above seven or eight inches aperture. My observations at Mt. Hamilton, 1888–91, would seem to indicate very rapid motion, and the failure to see the small star on very many occasions previous to that when it was looked for with large instruments make it practically certain that it could not have been on the arc described by the measures of 1854–99. The negative results can only be explained by rapid orbital motion, or by variability of the small star. It should be carefully examined at short intervals with large instruments.

The system has a considerable proper motion:

Porter	0″234	in	102°3
Bossert	0.247	in	104.0
A. G. Nico.	0.243	in	105.8

From the measured positions given above, See finds a provisional period of about 150 years, but it is evident that if the measures represent the total motion since 1854, nothing whatever can be inferred from them as to the period or form of the apparent orbit. So far the observed places are as well explained by rectilinear motion as any other.

[Da³ ... Hd ... Sadler (*Ast. Reg.* **XXIII**, 117) ... LM ... β (2929, 3048, 3114) (*Pub. L. O.* **II**) ... (*Ast. and A.-P.* **XII**, 681) ... See (3496, 3629) ... A (3584) (*Bul. L. O.* No. 11) ...]

(See p. 1061)

12m 15s **1652.** **Σ 373** *rej.* (AC = **OΣ (App) 33.**) There seems to be no change in either companion.

AB	1902.91	117°2	20″04	2*n*	β
AC	1902.91	110.4	117.50	2*n*	β

[Δ (I) ... Franz (2649) ... β⁶ ...]

12 24 **1655.** **β 1294.** The components are *red* and *green*. The magnitude of A in DM is 9.2 (β⁵).

12 28 **1656.** **Innes 341.** The magnitude of A in SD is 8.5.

[Innes (*Mon. Not.* **LXI**, 581; **LXII**, 473) ...]

12 45 **1657.** **β 1177.** Discovered with the 36-inch while examining 95 *Ceti* (= A. C. 2). This new pair is 31s.7 *f* and 5′ 42″ *s* of that star. The magnitude in DM is 9.3. The only later measures are:

1899.78	12°0	0″35	3*n*	A
1900.78	14.4	0.35	2*n*	Doo

[β (XVII) ... β (3047) (*Pub. L. O.* **II**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... A (3638) ...]

13 4 **1659.** 15 *Eridani.* **See 23.** The only other measure is:

1898.02	284°0	0″33	3*n*	A

[See (*A. J.* 431) ... A (3584) ... Cogshall (*A. J.* 505) ...]

13 11 **1660.** **Σ 374.** No change since Struve.

1866.63	294°6	10″71	3*n*	Δ
1881.69	295.5	11.15	3*n*	β
1904.79	295.3	10.90	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Seagrave (*Sid. Mess.* **II**, 274) ... β⁴ ... β⁶ ...]

1661. *Eridani* 129. **H 3565.** **B. A. C. 1004.** The declination in H is 5′ too small. Large star 6m in *O. Arg. S.* Marked double in Wash. T. Zones, 8m. Apparently fixed. 13m 12s

1845.87	109°6	5″73	1*n*	J	
1876.04	111.6	5.94	2*n*	Cin	
1886.89	114.9	5.90	2*n*	Scott	
1893.10	116.3	5.64	2*n*	Gla	5.2...8.6
1900.42	115.3	6.22	4*n*	Scott	

[J² ... Cin³ ... Cin⁴ ... Glasenapp (**II**) ... Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LIX**, 427; **LXIV**, 52) ... Do (3798) ...]

1663. **Σ 375.** No change in seventy years, but the stars have a common proper motion of 0″081 in 170°2 (*A. G. Berlin*). 13 19

1867.58	314°1	2″17	4*n*	Δ
1902.97	317.1	2.26	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII, XV**) ... Hd ... WS² ... Δ (**II**) ... β⁶ ...]

1664. **Σ 376.** (= **H II. 76** = **S 424.**) Fixed. 13 28

1865.49	251°4	6″76	3*n*	Δ
1892.92	250.8	6.72	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se³ ... Bp ... Wr ... Ra (**XXV**) ... Ba (**II**) ... Δ (1204) ... Δ (I, **II**) ... Du ... Per ... Per (2684) ... Lv¹ ... Giacomelli (**I**) ... Glasenapp (**II**) ... Chofardet (3450) ... *Annals Toulouse Obsy.* **III** ...]

1666. **A. G. 65.** Noted as double in *A. G. Leiden.* No near companion seen with the 40-inch, 1903. 13 30

1668. **Σ 377.** C not seen by Δ in 1866, and only with difficulty in 1868. I found it very plain with the 6-inch in 1873. There has been no change in the position of this star, and apparently no material movement in the close pair. 13 43

		A and B		
1846.13	121°6	1″01	3*n*	OΣ
1868.87	120.7	1.03	3*n*	Δ
1880.91	116.6	0.86	1*n*	β
1882.91	121.7	1.27	4*n*	En
1884.96	113.4	1.02	2*n*	Per
1899.14	115.9	0.95	2*n*	Sk
		AB and C		
1870.92	220°4	25″15	2*n*	Δ
1879.83	222.2	24.92	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (1736) ... Δ (**II**) ... Flm ... Sk ... **Per** Per (2748) ... En (2663) ... β³ ... *Annals Toulouse Obsy.* **III** ... Sk⁵ ...]

1670. **A. G. 66.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546). 13 50

1671–72. **H 3245** and **H 3246.** "The first and second stars of an equilateral triangle." The 40-inch shows a small companion to the third star of the triangle. A and C are DM (17°) 534 and 535. The only measures are: 13 56

B*b*	1902.87	98°6	11″00	2*n*	β	9.5...12.5
A*a*	1902.87	180.9	13.23	2*n*	β	9.3...11.0
C*c*	1902.83	157.8	16.54	1*n*	β	9.4...13.5
AB	1902.87	190.2	164.42	2*n*	β	
AC	1902.87	138.3	180.03	2*n*	β	
BC	1902.87	79.7	152.00	2*n*	β	

B*b* is H 3245, and A*a* H 3246.

[Lassell (*Mon. Not.* **XVI**, 59) ... β⁶ ...]

$14^m\ 12^s$ **1673.** τ^4 *Eridani.* **Jacob** I. Discovered by Jacob at Madras. No earlier measure of the distant star than that given. Other distant stars in β^3. The measures are insufficient to determine whether or not AB is fixed. The bright star has a proper motion of 0″041 in 26°0 (Auwers). Howe notes a faint pair in the field *p*, 330° : 3″ : 10...10.

A and B

1877.86	287°1	4″77	1*n*	Cin	
1880.02	281.8	5.41	1*n*	β	
1902.99	290.4	5.74	2*n*	β	...11.2

A and C

1902.97	103°3	39″64	3*n*	β	...10.8

[J³...Cin⁴...Cin⁶...Wilson (Cin¹⁰)...β¹...β²...β³...See (3495)...β⁶...]

14 41 **1676.** **Ho** 320. No other measures.

[Ho (3233) (*A. J* 215)...]

(See p. 1061)

15 0 **1677.** **Σ** 378. Fixed.

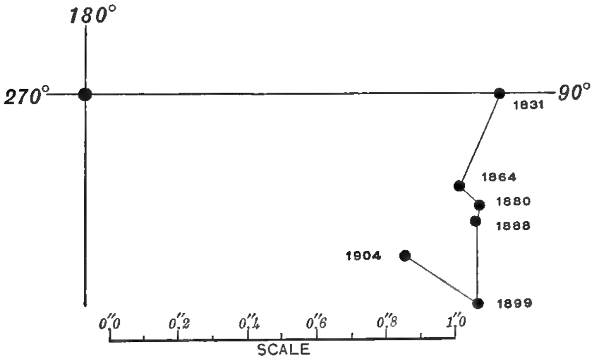
1868.24	313°1	18″57	4*n*	Δ
1881.69	314.6	18.92	3*n*	β
1904.82	313.0	18.69	2*n*	β

A similar pair, $2^m\ 25^s$ *f* and 9′ *s* was measured at first for Σ 378. This is DM (57°) 724.

1904.79	122°5	26″66	2*n*	β	8.2...10.5

[Ma (*F. S.* I)...H²...Δ (II)...β⁴...β⁶...]

15 17 **1678.** **Σ** 380. Probably binary. Slow change in angle, the distance remaining nearly constant.



Σ 380

1831.62	90°1	1″20	3*n*	Σ
1864.83	76.1	1.12	5*n*	Δ
1880.02	74.0	1.19	2*n*	Hl
1888.10	71.9	1.19	3*n*	Hl
1899.22	61.9	1.29	6*n*	Doo
1904.31	63.2	1.04	2*n*	β

[Ma (*F. S.* I)... Ma (**XI, XV**)... Se... Δ (1473)... Δ (**II**)...Gl...WS...WS²... Flm...Do (2303)...Sk...Hl (**I, II**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Sk⁵...Biesbroeck...β⁶...]

$15^m\ 31^s$ **1679.** **Σ** 379. (= **S** 425.) Unchanged. (See No. 1688.)

1866.59	102°0	10″23	3*n*	Δ
1904.79	100.9	10.36	2*n*	β

[Ma (*F. S.* I)...H¹...Δ (II)...Glasenapp (II)...β⁶...]

16 18 **1682.** **H** 3570. "Triple, or quadruple." In Heis 6m. The 6-inch showed an exceedingly faint star, which was subsequently measured with the 40-inch. That instrument shows no nearer companion, but there are other small stars in the field more distant.

1900.72	256°0	34″05	2*n*	β⁵	7...12

16 24 **1683.** **Σ** 381. The measures as a whole indicate no change.

1843.71	91°1	0″94	2*n*	OΣ
1868.63	92.6	1.00	4*n*	Δ
1883.89	94.6	0.99	2*n*	Per
1888.97	97.5	1.01	3*n*	Hl
1899.56	91.4	0.96	2*n*	A

[Ma (*F. S.* **I**)... Ma (**IX, X, XI**)... Δ (1118)... Δ (**I, II**)... OΣ (**IX**)... Hl (**I, II**) ...Sk³...Per...Per (2684)...A (3638)...]

16 59 **1686.** *Persei* 146. **Σ** 382. (= **H** 333.) H called the companion 16 m. Probably unchanged. The 40-inch shows a 14 m star, 173°2 : 27″8.

1868.88	153°1	3″89	4*n*	Δ
1903.74	153.1	4.18	2*n*	β

[Ma (*F. S.* I)...Δ (II)...β³...β⁶...]

17 : **1687.** **β** 742. This star was suspected to be a very close pair with the 6-inch on Mt. Hamilton in 1879. I made a careful search with the 36-inch in 1891 without finding any close pair in or near this place. The suspected elongation was probably not real.

[β (**XI**)...β²...β (3114) (*Pub. L. O.* **II**)...]

17 : **1688.** **H III.** 91. No such pair in this place. It is certainly identical with Σ 379.

17 20 **1689.** **β** 1178. Discovered with the 36-inch. The magnitude in DM is 7.7, and in *A. G. Albany* 7.3, while Gould gives 6.6. It is Lalande 6267. The only later measure is:

1899.84	348°4	0″51	1*n*	Barnard

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...]

17 25 **1691.** **Σ** 383. Fixed.

1865.60	119°8	5″62	3*n*	Δ
1895.84	120.0	5.23	1*n*	Gla

[Ma (*F. S.* I)...H¹...Ma (XI)...Se...Δ (II)...Glasenapp (IV)...]

17m 26s **1692.** **β 531.** Discovered with the 18½-inch. A naked-eye star in *Eridanus;* Heis 6.7 m, SD 6.5 m. It has a considerable proper motion, which obviously belongs to both components:

Stumpe	0″.250 in 180°.0
Porter	0.225 in 189.5

The later measures are:

1891.75	53°.6	2″.94	3*n*	β
1898.74	57.4	2.88	2*n*	β
1899.85	49.4	3.18	3*n*	Doo

[β (**X**)...β¹...β (3114)(*Pub. L. O.* **II**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

17 32 **1693.** **H 2187.** H (VIII) 325°.3 : 40″± : 8...12 (1835.9). Noted by H in looking for Σ 387, which he could not see. On account of this discrepancy in the position-angle in the measures of H, it was identified and measured:

1901.72	240°.4	56″.02	2*n*	β⁵	8.0...10.7

17 47: **1696.** **Σ 387** *rej.* From *Catalogus Novus.* I could not find any pair here but H 2187. Σ 387 *rej.* is identical with that pair, unless there is an error of 1° in the Decl., when it might be H 2188. (No. 1694.)

18 46 **1698.** **Σ 384.** Unchanged.

1865.71	269°.0	1″.89	3*n*	Δ
1904.72	268.3	1.73	3*n*	Miller

[Ma (*F S.* **I**)...Ma (**XIII, XV**)...Se...Δ (1118, 1185)...Δ (**I, II**)...T (2898)...]

18 47 **1699.** **β 12.** Discovered with the 6-inch. Unchanged.

1877.83	273°.3	2″.36	3*n*	Cin
1886.88	274.8	2.45	4*n*	LM
1888.53	272.6	2.31	2*n*	Lv
1898.85	272.4	2.14	3*n*	Bd

[β (**I**) ... β (*Mon. Not.* **XXXIII**, 351) ... Cin⁴...LM ... Lv¹ ... Boothroyd (*A. J.* 478)...Do (3798)...]

18 55 **1701.** **Σ 386.** Probably fixed.

1867.43	59°.6	2″.51	3*n*	Δ
1904.77	59.2	2.35	3*n*	Cogshall

[H (**V**)...Ma (*F. S.* **I**)...Δ (**II**)...]

19 16 **1702.** *Schj.* **2.** Measures from Cin⁶.

1904.75	183°.6	17″.23	3*n*	Miller

19 20 **1703.** **Σ 385.** **B. A. C. 1058.** Fixed. The measures in Ma belong to some other pair.

1867.61	162°.7	2″.24	4*n*	Δ
1904.73	160.0	2.49	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XV**)...Da²...Pk...Δ (**II**)...Ho (3558)...]

1704. **Holmes.** The only other measures are from the Kirkwood Observatory: 20m s

1904.72	49°.7	4″.88	3*n*	Miller	9.3...11.5

[Espin (*Mon. Not.* **LXII**, 591)...]

1705. **Σ 388.** Apparently no sensible change. 20 1

1865.05	208°.9	3″.00	3*n*	Δ
1896.12	209.9	2.96	3*n*	Sk

[Ma (*F. S.* **I**) ... Δ (**II**) ... Big...β (2020)... T (3185)... Glasenapp (**II**).. Espin (*Mon. Not.* **LXII**, 528)...Sk³...Sk⁵...]

1707. **Σ 393.** Fixed. 20 11

1868.28	258°.6	15″.77	4*n*	Δ
1904.75	259.0	15.53	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁶...]

1708. **Σ 389.** The later measures make the angle larger, 20 31
but as they show no change, it is probable that Σ's angle is too small, and that the stars are relatively fixed in angle as in distance.

1859.95	67°.2	2″.85	2*n*	Se
1865.19	66.0	2.76	2*n*	En
1868.38	64.2	2.63	4*n*	Δ
1880.02	65.7	2.70	3*n*	Hl
1881.20	65.8	2.94	4*n*	Je
1887.82	68.3	2.86	2*n*	T
1889.93	65.1	2.76	3*n*	Hl
1901.92	65.6	3.04	3*n*	Do

[Ma (*F. S.* **I**) ... Ma (**X, XII, XIII, XV**)... Se...Wr... Ra (**XXIII**)... Du ... En (1673)...Gl...H¹...H²...Da¹...Da²...Da³...Bl (**V**)...Flm...Δ (1204)... Δ (**I, II**)...Je (2449)... Seagrave (*Sid. Mess.* **II**, 22)... Hl (**I. II**)...T (2898) Glasenapp (**II**)... Maw (**II**) ... Big (*Bul. Ast.* **XII**, 299) ... Knorre (3300) ... Ebell (3321)...*Annals Toulouse Obsy.* **III**...Espin (*Brit. Ast. Ass'n* **III**, 226) (*Mon. Not.* **LXII**, 528)...Do (3798)...]

1709. 34 *Persei.* **β 1179.** Discovered with the 36-inch. 20 47
A difficult pair. The proper motion of this star is 0″.034 in the direction of 175°.0 (Auwers). The measures show that this is common to both stars.

1898.73	164°.5	0″.70	3*n*	Hu

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...]

1710. **OΣ 54.** (= **H 1135.**) *Clear yellow: olive,* Δ. Perhaps a little advance in the angle, with less distance. The 20 50
principal star is given a proper motion of 0″.050 in 152°.7 (Schroeter).

1866.74	355°.1	25″.40	3*n*	Δ
1898.13	356.3	24.74	3*n*	Hu
1903.83	356.3	24.40	3*n*	β

[H (**IV**)...Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...Do (3798) ...β⁶...]

1711. **Σ 390.** **B. A. C. 1065.** (= **H N. 66.**) The proper 20 51
motion of the large star is given:

A. G. Harvard	0″.079 in 287°.6
Kustner	0.050 in 247.7

No relative change since Struve:

1867.02	159°.2	14″.57	4*n*	Δ
1904.79	158.8	14.68	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)... Pk ... Seagrave (*Sid. Mess.* **II**, 274) ... Glasenapp (**II**) ...Espin (*Brit. Ast. Ass'n* **III**, 226)(*Mon. Not.* **LXII**, 528)...β^{6}...]

20^{m} 57^{s} **1712.** **H** 3574. "Near a cometic nebula." Looked for with the 40-inch in 1901 and 1904, but nothing found which could be identified as H 3574. The nebula is a conspicuous object, and is SD (21°) 624.

21 0 **1713.** **Σ** 391. Unchanged.

1868.11	94°.8	3″.86	4*n*	Δ
1904.76	95.7	3.80	3*n*	Cogshall

[Ma (*F. S.* **I**)....Se....Wr....Ra (**XXIV**)....Δ (1204)....Δ (**I, II**)....Glasenapp (**IV**)...]

21 3 **1714.** **A. G.** 67. Noted as a 10″ pair in *A. G. Lund.* Measures by β^{6}.

21 4 **1715.** **OΣ** 55. Probably unchanged, but measures of distance conflicting.

1843.22	288°.5	28″.07	1*n*	Ma
1898.17	293.3	27.26	3*n*	Hu
1904.93	293.2	27.14	2*n*	β

Aitken has added a companion to B which I noted independently and measured later:

1904.76	235°.8	3″.50	1*n*	A	10.8...13.8
1904.91	233.1	4.24	1*n*	β	10.8...13.5

[Ma (**XI. XIII**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^{6}...]

21 6 **1716.** **Σ** 394. (= **S** 426 = **H** **III.** 77.) Unchanged.

1865.78	161°.8	6″.93	3*n*	Δ
1889.44	162.3	7.03	7*n*	Giacomelli

[Ma (*F. S.* **I**).... Ma (**XI, XIII**).... Ra (**XXV**).... Wr.... Se....Se^{3}....Ba (**II**) ....Δ (1013, 1256)...Δ (**I, II**)... Du...Per... Per (2684)... Cin^{6}...Giacomelli (**I**)...*Proc. Haverford Coll. Obsy.* 1892 ...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**....]

21 23 **1718.** **Σ** 392. *Orange: blue*, H (V). Fixed.

1868.24	346°.6	25″.75	4*n*	Δ
1904.76	346.7	25.53	3*n*	Miller

[H (V)...Δ (**II**)...Ma (*F. S.* **II**)...Espin (*Mon. Not.* **LXIV**, 676)...]

21 26 **1719.** **Σ** 395. Probably fixed.

1868.44	102°.0	1″.87	4*n*	Δ
1904.75	100.7	1.45	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{3}...]

21 28 **1720.** 66 *Arietis.* **β** 878. Discovered with the 18½-inch. A more difficult pair than the distance and magnitudes would indicate. This star has a considerable proper motion:

Auwers	0″.120 in 185°.3
Porter	0.115 in 186.9

It is apparent from the measures that this is a physical pair, as the stars have the same proper motion.

1890.89	76°.1	1″.29	3*n*	β
1899.67	77.6	1.13	3*n*	Lewis
1899.95	74.8	1.24	3*n*	Doo

[β (**XIII**)...β^{3}...β (3048)(*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXII**, 383)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I**)...]

1721. **Kr** 20. Noted as double in *A. G. Hels.* 21^{m} 41^{s}

1899.98	295°.6	7″.76	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

1722. **See** 25. Discovered at the Lowell Observatory. 21 44

1899.01	15°.2	10″.07	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 506)...]

1723. **Hn** 8. Without motion. 21 57

1903.84	174°.4	2″.22	2*n*	β

[β^{4}...Com (**VI**)...Hu (*Bul. L. O.* No. 44)...β^{6}...]

1724. **β** 879. A distant attendant noted with the 18½-inch. Lalande 6400. 22 3

1898.72	70°.4	24″.50	2*n*	β
1898.80	71.7	24.62	3*n*	A

[β (**XIII**)...β^{3}...A (3584)...]

1725. **β** 1180. Discovered with the 36-inch. No change in ten years. 22 23

A and B

1900.63	20°.3	0″.44	3*n*	A

A and C

1899.09	119°.4	7″.07	2*n*	β

[β **XVII**)...β (3048)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (*Bul. L. O.* No. 11)...]

1729. **OΣ** 56. Apparently a decided change in the distance. The distance by Ma seems to be too large if the others are correct. 23 6

1843.22	350°.9	22″.88	1*n*	Ma
1867.69	352.2	22.81	3*n*	Δ
1898.17	351.8	25.17	3*n*	Hu
1904.84	351.8	25.62	2*n*	β

[Ma (**XI, XIII**)...Ba (**I**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^{6}...]

(See p. 1062)

1730. **H** **IV.** 89. (= **Σ** 399 *rej.*) The larger star has a proper motion of 0″.203 in 108°.0 (Porter), and the small star is moving with it, as there has been no relative change. The following are all the measures since H. 23 35

1879.66	147°.3	20″.40	1*n*	Cin	8.0...9.5
1897.54	146.6	20.24	5*n*	Doo	8 ...9
1901.77	147.0	20.31	2*n*	β	8.1...9.5

[H (V)...Cin^{6}...Doolittle (*Pub. Flower Obsy.* **I**)...β^{5}...]

$3^m 48^s$ **1731.** **Σ 7, App. I.** (= **S** 427 = **OΣ (App)** 34.) Relatively fixed. Given in the list of new pairs in Ma (XI).

1869.95	233°1	44″07	6*n*	Δ
1904.76	233.0	44.18	3*n*	Cogshall

[Ma (**XI**)...Ra (**XXVI**)...Wn (1738)...Δ (**II**)...Je (2329)...Glasenapp (**II, III**) ...Franz (3464)...]

23 55 **1732.** **Σ** 396. Fixed.

1866.38	242°4	20″32	4*n*	Δ
1904.84	243.0	20.32	2*n*	β

Ma (*F. S.* **I**)...Ra (**XXIII**)...Δ (**II**)...β^3...Espin (*Brit. Ast. Ass'n* **III**, 226)... *Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 528)...β^6...]

24 5 **1733.** **Σ** 401. (= **S** 428.) Without change.

1867.61	270°3	11″29	4*n*	Δ
1889.34	270.0	11.36	12*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIII, XXVI**)...Da^2...Wr...Se...Se^3...Wn (1738)...Δ (1013, 1209)...Δ (**I, II**)...β^3...Je (2329)...T (2991)...Giacomelli (**I**)...Glasenapp (**II, III**)...*Annals Toulouse Obsy.* **III**...]

24 8 **1735.** **Σ** 397. Fixed.

1868.74	42°0	5″17	4*n*	Δ
1904.73	42.5	4.86	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...]

24 16 **1737.** **Σ** 407. The later measures make the angle larger without showing change. The components have a common proper motion of 0″141 in 200°7 (Porter).

1868.22	45°4	2″57	4*n*	Δ
1879.00	48.6	2.28	3*n*	β
1884.86	43.8	2.73	2*n*	Wilson
1888.10	47.2	2.73	3*n*	Hl
1902.88	45.3	2.57	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (**V, VIII**)...Δ (**II**)...Cin^6...LM...Wilson (Cin^{10})...β^3...β (*Mon. Not.* **XXXIV**, 371)...Flm...Hl (**II**)...Δ (2194)... Pt...β^6...]

24 19 **1738.** **Σ** 403. (≒ **H** I 55.) On the whole, change is uncertain. The principal star has a proper motion of 0″039 in 60°8 (Battermann).

1783.01	172°8	....	1*n*	H
1865.98	178.0	2″89	3*n*	Δ
1892.80	176.6	3.26	2*n*	Jones
1903.03	177.1	2.70	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...En (1673)...Δ (**II**)...Pl...Flm...Sk^3...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Do (3930)...]

24 21 **1739–40.** **Σ** 404 and 405 *rej.* Measures by β^6. No other observations.

24 28 **1742.** **Σ** 406. Probably fixed.

1867.14	124°3	9″29	4*n*	Δ
1893.00	123.6	8.43	2*n*	Gla
1904.92	124.0	9.08	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^1...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

$24^m 42^s$ **1743.** **Σ** 408. All the later measures give a smaller angle, but do not show motion. It is probable, therefore, that the angle in Σ is too large.

1857.10	338°3	1″24	2*n*	Se
1865.16	338.9	1.31	5*n*	Δ
1878.08	339.9	1.24	2*n*	Hl
1886.75	336.2	1.48	3*n*	LM
1888.13	339.0	1.24	3*n*	Hl
1889.00	336.7	1.44	2*n*	Lv
1902.11	333.6	1.65	2*n*	Do

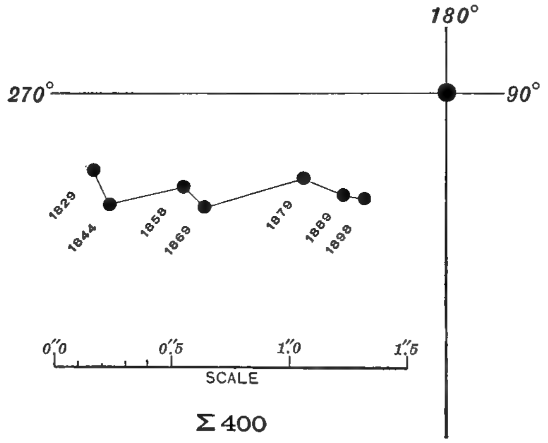
[Ma (*F. S.* **I**)...Ma (**XI**)...Se...OΣ (**IX**)...Do (2196)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Hl (*Wash. Obsns.* 1880)...Hl (**I, II**)...Δ (1473)...Δ (**II**) ...Gl...WS...Cin^4...Cin^6...Wilson (Cin^{10})...LM...Lv^1...Flm...En (2742)...Do (3378, 3799)...*Annals Toulouse Obsy.* **III**...]

24 43 **1744.** **Σ** 398. Not measured by Dembowski. Not in the DM. Place by Aitken from comparison with *A. G. Hels.* 3054. Probably no change since Struve.

1896.99	332°0	9″33	3*n*	A
1897.64	330.5	9.72	5*n*	Doo

[Ma (*F. S.* **I**, 67; **II**, 208)...A (3465)...Doolittle (*Pub. Flower Obsy.* **I**)...Espin (*Mon. Not.* **LXII**, 528)...]

25 12 **1747.** **Σ** 400. Probably a binary of long period, but the apparent motion for seventy years has been practically rectilinear.



1829.94	282°6	1″53	3*n*	Σ
1844.71	288.3	1.50	2*n*	OΣ
1858.45	289.8	1.18	2*n*	OΣ
1869.30	295.3	1.13	4*n*	Δ
1879.59	301.8	0.70	2*n*	Hl
1889.93	315.9	0.62	3*n*	Hl
1898.10	323.0	0.56	3*n*	A
1904.75	328.9	0.73	2*n*	Cg

[Ma (*F. S.* **I**)...Ma (**XV**)...OΣ (**IX**)...H^1...Se...Δ (1118)...Δ (**II**)...Flm... Sk...Gl...Bl (**V**)...Hl (*Wash. Obsns.* 1880)...Hl (**I, II**)...Glasenapp (**II**)... HΣ (**XII**)...Big (*Bul. Ast.* **XII**, 299)...A (3584)...Sk^5...]

(See p. 1062)

25 24 **1748.** **Hn** 65. No other measures (*Pub. Washburn Obsy.* II, V).

25 37 **1750.** **A. G.** 68. Measures from *A. G. Leipzig.* (See No. 1753.)

1903.24	250°2	17″77	3*n*	Miller

25m 49s **1751.** **β 787.** Discovered with the 15½-inch at the Washburn Observatory. There seems to be some change in the angle.

Hussey measures a third star, 175°.8 : 12″.70 (1898.70) 1*n*. I could not see this on one night with the 40-inch, but measured 11 m star in nearly the same direction, 175°.6 : 36″.78 (1899.13) 1*n*.

1885.96	227°.3	2″.35	1*n*	HΣ
1888.59	233.1	2.02	3*n*	Com
1898.70	245.6	2.39	1*n*	Hu
1899.13	243.3	2.40	1*n*	β
1899.98	240.9	2.64	3*n*	Doo
1904.84	250.9	2.33	1*n*	β

[β (XII)....β4....β (*Pub. Y. O.* I)....Com (*Pub. Washburn Obsy.* VI)....HΣ (XII)...Hu (*Bul. L. O.* No. 44)...Doolittle (*Pub. Flower Obsy.* I)...β6...]

25 40 **1752.** **Σ 402** *rej.* The only measures are:

1904.89	162°.0	12″.42	2*n*	β6	8.2...10.8

25 42: **1753.** **H IV. 44.** (= **Σ 409** *rej.*) Place from H. There is no doubt of the identity of this with No. 1750.

25 57 **1754.** **Ho 14.** The only other measure is:

1895.01	21°.1	1″.62	2*n*	Ho

[Ho (2778, 3558, p. 89)...]

(See p. 1062)

26 20 **1755.** **OΣ 57.** (AC = **σ 95** = **S 429** = **OΣ (App) 35.**) All relatively fixed. Richenberg (3482) assigns to C a large proper motion:

A = 0″.057 in 256°.8
C = 0.636 in 266.9

It is evident from the measures that whatever this motion is, it is practically the same for both stars.

A and B

1869.27	319°.5	9″.65	4*n*	Δ
1898.60	319.9	9.80	4*n*	Hu

A and C

1869.20	34°.9	71″.03	4*n*	Δ
1898.43	34.6	70.84	4*n*	Hu

[OΣ (IX, X)...Δ (I)...Per...Per (2749)... Franz (3464)...Hu (*Pub. L. O.* V)... HΣ (XII)...]

26 22 **1756.** **Σ 411** *rej.* Measures from H (V). Double only in Σ. B is SD (7°) 619.

AB	1880.10	88°.2	19″.40	1*n*	β	7.0... 8.0
	1903.82	88.1	18.58	3*n*	β	8.0... 9.0
AC	1880.10	28.2	37.69	1*n*	β	...10.8
	1903.84	28.3	38.67	2*n*	β	...12.7

[β3...β6...]

26 28 **1757.** **H 334.** (= **OΣ 540.**) Fixed. This was found at Poulkowa, and by reason of the error in place of Σ 410, on the statement of H that H 334 and Σ 410 were identical, OΣ 540 was regarded as a new pair.

1864.02	142°.2	13″.36	2*n*	OΣ	8.0...11.2
1880.23	140.2	13.32	3*n*	β	8.3...11.2
1899.68	138.7	14.29	3*n*	Hu	

[OΣ (IX)...β3...β (2020)...Hu (*Pub. L. O.* V)...]

1758. **A. G. 69.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554). 26m 57s

1759. **β 788.** Discovered with the 15½-inch at the Washburn Observatory. The only later measures are: 27 9

A and B

1888.06	302°.2	2″.66	3*n*	Com

A and C

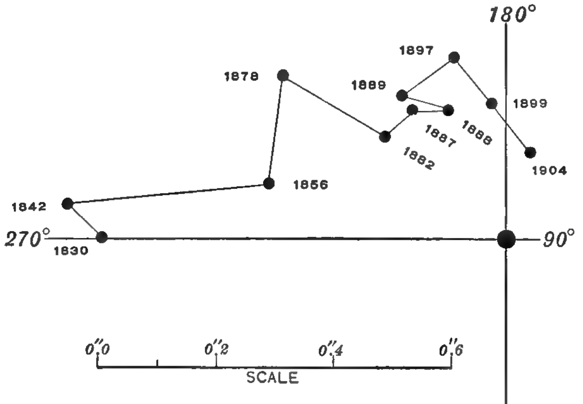
1887.99	82°.4	34″.00	2*n*	Com

[β (XII)...β4...Com (*Pub. Washburn Obsy.* VI)...]

1760. **See 26.** Discovered at the Lowell Observatory. Cogshall could not be certain of any elongation on three nights in 1899. 27 16

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

1761. 7 *Tauri.* **Σ 412.** (AC = **H IV. 88** = **Sh 363.**) The close pair is a binary of long period. The distance has been steadily diminishing since its discovery by Σ. The proper motion is 0″.035 in 180° (*A. G. Berlin*). 27 20



7 Tauri. Σ412

1830.38	269°.9	0″.69	5*n*	Σ
1842.04	265.7	0.75	3*n*	OΣ
1856.35	256.8	0.42	3*n*	Se
1878.57	233.9	0.47	7*n*	Sp
1882.84	228.9	0.27	7*n*	En
1887.09	215.6	0.27	8*n*	Sp
1888.07	203.5	0.24	7*n*	Sp
1889.64	216.4	0.30	4*n*	β
1897.14	195.9	0.32	6*n*	Lewis
1899.75	185.9	0.23	4*n*	A
1904.84	165.8	0.16	1*n*	β

The change in the angle of the distant star appears to be explained by the proper motion of AB.

1851.81	61°5	22″16	1*n*	OΣ
1863.18	61.1	22.02	3*n*	Δ
1871.73	60.7	22.08	3*n*	OΣ
1889.64	59.7	22.13	3*n*	β
1904.54	59.1	22.15	2*n*	β

[Ma (*F. S.* I)...Ma (**IX, X, XI, XIII, XV**)... H^2... Bp ... Da^3...En (1673, 2663) ...Ba (**II**)...Se...Se^3...Se (*Comp. Rend.* **XLVIII**, 375)... Hd ...Δ (1473)... Δ (**II**)...OΣ (**IX**)... Kn ...Do (2242, 2307, 3680)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Sk...Gl...Sp (**II**)...Sp (**II, App.**)...Per...Per (2684)...Hl (**I, II**)....T (2991)....WS....Bru^2....Big....β (2957)....β (*Pub. L. O.* **II**).... Glasenapp (**II**)...Big (*Bul. Ast* **XII**, 299)...Com (*Pub. Washburn Obsy.* **X**) ...Ra (**XLVI**)... HΣ (**XII**)...Sk^5... Hu (*A. J.* 427)...A (3639)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...Biesbroeck...β^6...]

27^m 25^s **1762.** **β** 532. Discovered with the 18½-inch. Probably no change. There is an 8 m star 80″ distant in the direction of 310°.

1891.86	271°2	3″05	2*n*	β
1898.89	271.4	2.99	2*n*	Cg
1901.21	269.4	3.38	2*n*	Hu

[β (**X**)...β^1...β^2...β^3...β (3114)...β (*Pub. L. O.* **II**)... Cogshall (*A. J.* 478)... Hu (*Bul. L. O.* No. 44)...]

27 27 **1763** **Σ** 417 *rej.* Later positions are:

1830+	178°3	25″±	1*n*	H (V)	8–9...10–11
1901.72	179.6	25.78	2*n*	β^5	8.5... 9.6

27 32 **1764.** **Σ** 410. Place erroneous in *Pos. Med.*, which gives that of H 334. (No. 1757). No evidence of change. The distance by Lewis in 1899 is printed 11″64. Double distance?

1876.84	206°0	5″58	5*n*	Δ
1880.23	208.8	5.34	3*n*	β
1904.92	207.0	5.26	2*n*	β

[Ma (*F. S.* I)...OΣ (**IX**)...Δ (1736, 2195)...Δ (**II**)...β (2020)...β^3...Lewis (*Mon. Not.* **LX**, 496)...β^6...]

27 32 **1765.** **See** 27. Later measures give a larger distance:

1899.72	350°8	0″60	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

27 33 **1766.** **Σ** 414. (= **OΣ** 58 *rej.*) Without change. (See No. 1780.)

1865.92	185°8	7″26	3*n*	Δ
1899.26	185.2	7.44	3*n*	Hu
1902.96	184.2	7.33	1*n*	Do

[Ma (*F. S.* I)...Ma (**XI, XV**)...Bp...Ba (**II**)...Se...Se^3...Ra (**XXVI**)...Sk^3... Δ (1204)...Δ (**I, II**)...Ferr...Cin^6...Giacomelli (**I**)...Glasenapp (**II**)...Espin (*Brit. Ast. Ass'n* **III**, 229)...Chofardet (3450)...Hu (*Pub. L. O.* **V**)...*Annals Toulouse Obsy.* **III**...Thiele (3837)...Do (3930)...]

27 55 **1770.** **Σ** 413. Fixed.

1866.66	128°3	2″46	4*n*	Δ
1895.92	130.6	2.53	1*n*	Gla

[Ma (*F. S.* I)...Se...Δ (**II**)...Glasenapp (**IV**)...]

1771. **Σ** 416 *rej.* From H (V). This is No. 27 of Schjellerup's *Catalogue of Red Stars.* 28^m 2^s

1879.66	52°7	25″89	1*n*	Cin	8.5...9.5
1901.73	56.5	26.42	2*n*	β	8.8...9.7

There is a nearer 11.5 m star, 292°9 : 22″61 (1901.72) first noted by Espin.

[Espin (*Brit. Ast. Ass'n* **III**, 228)...Cin^6...β^5...]

1772. **Σ** 415. Perhaps a little increase in the distance. 28 7

1866.15	51°7	15″27	3*n*	Δ
1891.99	51.4	15.47	5*n*	HΣ
1904.76	51.9	16.13	3*n*	Miller

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...HΣ (**XII**)...]

1774. **β** 533. Discovered with the 18½-inch. The principal star has a small proper motion which seems to belong to the companion. Relative change uncertain. 28 9

1883.12	59°8	0″25	5*n*	En
1886.15	47.4	0.53	2*n*	HΣ
1890.61	50.7	0.5±	5*n*	Sp
1891.69	52.2	0.51	3*n*	β
1898.12	49.7	0.51	2*n*	Bowyer
1898.82	52.4	0.64	3*n*	Hu
1903.69	47.2	0.51	4*n*	Bowyer

[β (**X**)...β^1...β (3114)...β (*Pub. L. O.* **II**)...En (2678)...HΣ (**XII**)...Sp (**III**).. Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**. 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)....Hu (*Bul. L. O.* No. 44)(*A. J.* 427)....Doolittle (*A. J.* 547)...]

1776. **β** 1040. Discovered with the 36-inch. The magnitude in DM is 7.4. 28 49

1898.73	338°0	3″56	1*n*	β
1904.08	329.9	3.52	1*n*	A

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A ( )...]

1778. **Hn** 9. Discovered at the Washburn Observatory. 29 11

1887.87	62°1	1″72	4*n*	Com

[β^4...Com (**VI**)...]

1779. **Σ** 420. Without change. 29 24

1867.77	112°3	6″46	4*n*	Δ
1904.76	111.7	6.58	2*n*	Miller

[Ma (*F. S.* I)...Δ (**II**)...]

1780. **Ħ** III. 78. (= σ 98). I could not find any pair in this place. It is certainly identical with Σ 414, there being an error of 1° in Decl. of Ħ. (See No. 1766.) 29 24:

1781. **OΣ (App)** 36. Evidently without change. 29 26

1881.69	70°1	46″10	3*n*	β

[Δ (**I**)...β^4...Franz (2649)...]

30m 2s **1783.** S 430. (= σ 97 = OΣ (App) 37.) Without change. The 40-inch shows two smaller stars, 37°7 : 29″4, and 0°2 : 55″3.

1859.96	95°2	41″15	3*n*	OΣ	
1875.96	95.0	41.23	3*n*	Δ	6.2...6.6
1904.83	95.4	41.06	2*n*	β	

[Δ (I)...OΣ (**X**)...Franz (3080)...Espin (*Mon. Not.* **LXII**, 531)...β^6...]

(See p. 1062)

30 19 **1785.** See 28. The only other measure is:

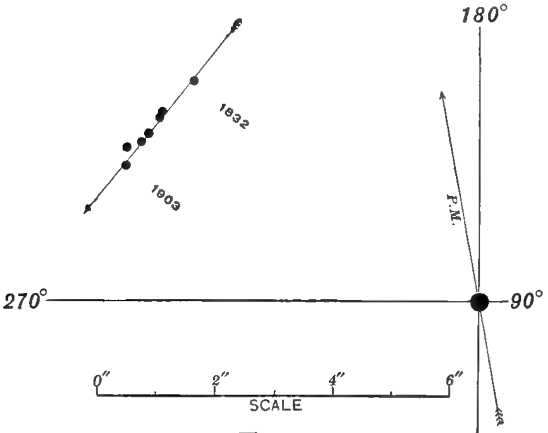
1899.48	104°0	10″02	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

30 38 **1787.** Σ 422. (= Ħ III. 45 = S 431.) This system seems to belong to the 61 *Cygni* type, the components having slightly different proper motions. The movement of the brighter star from meridian observations is given:

Porter	0″148 in	190°5
A. G. Nico.	0.161 in	187.5

1832.75	232°2	6″13	3*n*	Σ
1858.90	239.3	6″25	2*n*	OΣ
1864.86	240.0	6.26	5*n*	Δ
1878.63	243.2	6.29	4*n*	Sp
1880.42	244.8	6.35	4*n*	β
1889.64	246.3	6.52	3*n*	HΣ
1903.91	249.1	6.37	4*n*	β



Σ 422

⅃ (1185) suspected an elongation of the principal star in about 245°. It appeared to me perfectly round in 1876 and 1880, and no elongation noticed in 1903. HΣ has an observation, noted as uncertain, 101°8 : 0″35± (1887.86).

[Ma (*F. S.* I)...Ma (**X, XV**)...Ra (**XXI, XXVI**)...WJ...WJ^2...J^2...En (1673, 2742)...Se...Se^3...Δ (1185, 1800)...Δ (**I, II**)...Ba (**II**)...Bp...Gl...WS...WS^2...OΣ (**IX**)...Do (2196, 2989, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Pl...Sk...Hd...Sp (**II**)...Hl (**I, II**)...Wilson (Cin^{10})...Je (2449)...T (2991)...Hayn (3051)...Du...β^3...Giacomelli (I)...Jones (*Proc. Haverford Coll. Obsy.* 1892)....Maw (**II**)....Collins (*A. J.* 378)....Solá (3563)....*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk^5...Thiele (3837)...β^6...]

30 43 **1788.** Σ 419. Unchanged.

1868.61	75°1	3″02	4*n*	Δ
1904.89	73.8	2.96	2*n*	β

Since this page was in type, Aiken has found B to be a close pair:

1904.94	346°0	0″40	1*n*	A	7.3...10.0

[Ma (**XI**)...H^2...Wr...Se...Ra (**XXIII**)...Δ (1204)...Δ (**I, II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Glasenapp (**II**)....Knorre (3518)....*Annals Toulouse Obsy.* **III**....β^6....]

(See No. 12946)

1789. Σ 418. The distance is increasing from rectilinear motion. The annual movement is about 0″046. 30m 52s

1831.45	61°8	16″10	3*n*	Σ
1848.23	63.5	16.79	1*n*	Ma
1867.56	62.8	17.51	4*n*	Δ
1896.35	63.3	19.08	2*n*	A
1904.84	63.5	19.25	2*n*	β

[Ma (*F. S.* I)...Ma (**XI, XII**)...Δ (1572)...Δ (**II**)...Flm...A (3395)...β^6...]

1791. H 2197. Looked for twice with the 40-inch in 1904; nothing found which seemed to be H 2197. 31 40

1792. Σ 424. No material change. 31 54

1866.59	315°3	9″84	3*n*	Δ
1904.32	314.4	9.96	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^6...]

1793. OΣ 60. Elongation suspected in 1841 by OΣ, and again in 1844 and 1847. ⅃ found it single 1865, as I did with the 18½-inch in 1878, and it was single or doubtful to Perrotin in 1883–84. Hussey found it perfectly round in 1898–99 with the 36-inch. It is probably not double. 31 59

[OΣ (**IX**)...Δ (**I**, p. 227)...β^3...Per...Per (2684)...Hu (*Pub. L. O.* **V**)...]

1795. β 308. Discovered with the 6-inch. Probably fixed. Lalande 6709. 32 4

1876.02	332°9	1″65	3*n*	Hl
1886.67	331.7	1.78	3*n*	LM
1888.05	331.8	1.80	2*n*	Hl
1898.86	330.8	1.88	3*n*	Cg
1903.83	326.5	1.53	3*n*	A

[β (**VI**)...β (2062)...Δ (**I**)...Cin^4...LM...Hl (**I, II**)...Cogshall (*A. J.* 478)...A ( )...]

1797. OΣ 59. Without change. 32 19

1870.54	351°0	2″39	6*n*	⅃
1898.14	350.4	2.63	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Da^3...Δ (**I**)...Hu (*Pub. L. O.* **V**)...Maw (**IV**)...Espin (*Mon. Not.* **LXIV**, 676)...]

1799. Σ 425. (= Ħ II. 52 = S 432.) The measures differ widely for so easy a pair, but slow retrograde motion in angle is very probable. 32 32

1783.06	98°2	....	1*n*	Ħ
1868.79	100.8	2″61	4*n*	Δ
1874.58	101.8	2.42	4*n*	Du
1882.09	97.1	2.64	3*n*	Je
1884.98	93.7	2.67	2*n*	Per
1887.72	93.0	2.70	3*n*	T
1889.93	94.1	2.66	3*n*	Hl
1894.19	92.7	3.00	3*n*	Maw
1903.75	90.6	2.44	5*n*	Bowyer

[H^1...H^2...Ma (*F. S.* I, pp. 20, 96)...Ma (**IX, XIII, XV**)...Da^1...Da^3...Ba (**II**)..Bp...Se...Se^3...Ra (**XXIV**)...Wr...Hd...⅃ (1013)...Δ (**I, II**)...Gl...Du...Flm...Je (2449)...Per...Per (2748)...Sk^2...T (2898)...Big...Big (*Bul. Ast.* **XII**, 299)...Hl (**II**)...Hayn (3051)..Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II, III**)...Maw (**II, IV**)...Knorre (3300, 3318)...Ebell (3321)...Espin (*Brit. Ast. Ass'n* **III**, 229)...Do (3798)...Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIII**, 403)...]

$32^m\ 38^s$ **1800.** H 3250. The only measures are:

1904.92	149°6	39″38	2*n*	β^6	7.5...13

32 45 **1801.** β 1231. Discovered with the 12-inch. C is DM (65°) 358. The principal star has a proper motion of 0″072 in 157°8 (Schroeter). The only later measures are:

A and B

1898.89	13°1	2″61	1*n*	A

A and C

1898.89	252°6	84″06	1*n*	A

[β (XVIII)...β (3113) (*Pub. L. O.* II)...A (3584)...]

32 50 **1802.** P III. 97. From Webb's *Celestial Objects*. Espin notes a nearer star, 96°2 : 18″68 (1892.99) 1*n*.

AB	1903.80	93″6	21″43	1*n*	β	...13
AC	1903.82	301.1	34.70	1*n*	β	...13
CD	1903.81	35.6	54.60	3*n*	β	6.6. . 8.4

[Kn...Bl (V) ... Espin (*Ast. and A.-P.* XII, 282) (*Brit. Ast. Ass'n* III, 227) ... β^6...]

32 54 **1803.** β 1181. Discovered with the 36-inch. Near OΣ 59. Later observers reverse the angle. Their measures are:

1898.70	88°9	0.40	1*n*	Hu
1901.09	86.7	0.45	3*n*	Doo
1904.65	85.3	0.24	1*n*	A

[β (XVII)...β (3047) (*Pub. L. O.* II)...Hu (*Bul. L. O.* No. 44)...Doolittle (*A. J.* 547)...A ( )...]

32 55 **1805.** Σ 426. Unchanged. The 40-inch shows a 13.5 m star near B, 37°2 : 12″6.

1867.52	341°0	19″82	4*n*	Δ
1904.83	341.5	19.72	2*n*	β

[Ma (*F. S.* II)...Δ (II)...Seagrave (*Sid. Mess.* II, 274)...T (2898)...β^6...]

33 1 **1807.** β 534. Discovered with the 18½-inch. No material change.

1891.86	193°1	2″58	2*n*	β
1898.87	194.1	2.66	2*n*	Bd

[β (X)...β^1...β^3...β (3114) (*Pub. L. O.* II)...Boothroyd (*A. J.* 478)...]

33 18 **1810.** *Tauri* 34. Σ 427. (= H N. 23 = S 433.) Fixed.

1866.37	208°6	6″57	3*n*	Δ
1890.93	208.0	6.77	4*n*	Gla

[Ma (*F. S.* I)...Ma (XI, XIII, XV)...H^1...Da^1...Da^3...Wr...Se...Se^3...Ra (XXVI)... Ba (II)... Δ (1036, 1185, 1256)...Δ (I, II)... Du...WS^2... Per... Per (2684)...Giacomelli (I)... Glasenapp (II, III)...*Annals Toulouse Obsy.* III...]

33 32 **1812.** Σ 421. Fixed.

1868.70	234°6	12″45	4*n*	Δ
1881.69	234.2	12.53	3*n*	β
1904.83	234.6	12.25	2*n*	β

[Ma (*F. S.* I)... Ma (XI)... Δ (II)... Do (2989) (*Trans. R. I. Acad.* XXIX, Part 13)...β^4...β^6...]

$33^m\ 58^s$ **1813.** Σ 429 *rej.* The only measures are:

1904.92	103°0	16″65	2*n*	β^6	9.0...11.5

34 8 **1814.** Σ 430. *Tauri* 39. There is no change in AB. Struve's distance of C seems to be too large, or error in printing. Madler has no measure of AC. The distance is decreasing.

A and B

1831.23	55°3	26″57	3*n*	Σ
1864.21	55.7	26.16	4*n*	Δ
1879.08	55.5	26.11	4*n*	β
1897.04	55.7	26.46	5*n*	Doo
1904.29	56.1	26.08	4*n*	β

A and C

1831.23	301°9	39″40	3*n*	Σ
1864.21	301.2	37.74	4*n*	Δ
1879.08	300.9	37.72	4*n*	β
1889.65	301.1	37.35	3*n*	HΣ
1897.04	301.2	37.43	5*n*	Doo
1904.29	300.8	36.89	4*n*	β

[Ma (*F. S.* I) ... Ma (XI)...Δ (1473)...Δ (II)... Flm...β^1...β^3...β (2363)... Glasenapp (II)...Doolittle (*Pub. Flower Obsy.* I)...*Annals Toulouse Obsy.* III...HΣ (XII)...β^6...]

34 19 **1816.** Σ 433 *rej.* The place in Part I is from H (V), which is substantially correct. Since identified and measured. The components are SD (8°) 699 and 698.

1904.84	332°7	35″79	2*n*	β^6	8.4...9.5

34 31 **1817.** A. G. 70. Double in *A. G. Lund.* Measures by β^6.

34 46 **1818.** 40 *Persei.* Σ 431. (= H III. 39.) Fixed.

1866.14	238°4	19″98	3*n*	Δ
1903.85	237.7	19.80	3*n*	β

[Ma (*F. S.* I)... Ma (XIII) ... Ra (XXIII) ... Δ (II) ... β^1... T (2898) ... Espin (*Brit. Ast. Ass'n* III, 229)...β^6...]

34 47 **1819.** A. G. 71. Noted as double in *A. G. Christiana.*

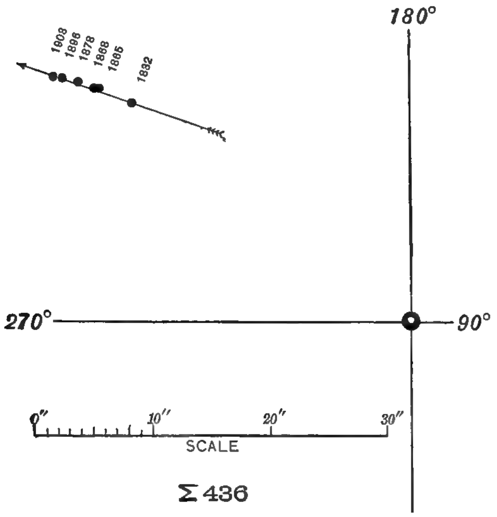
[β (*Pub. L. O.* II)...]

34 54 **1820.** H 336. (= Σ 432 *rej.*) From H (VII). The only measures are:

1904.81	317°1	36″32	4*n*	β^6	7.7...10.6

35 11 **1821.** Σ 436. The distance is increasing, but the motion is rectilinear. Considering the small star as fixed in space, the measures of Σ, Δ, A, and β give for the proper motion of the larger star, 0″116 in 69°4. From the meridian positions

of this star Furner and Storey find only a small movement, and hence assume that the motion is principally in B. The companion is SD (13°) 712.



Σ 436

1832.51	232°.4	30″.21	4*n*	Σ
1865.97	233.5	33.23	6*n*	Δ
1868.94	234.1	33.53	3*n*	Du
1878.58	234.5	34.79	2*n*	Cin
1896.14	235.5	36.13	3*n*	A
1903.93	236.0	36.86	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VIII**)...Ra (**XXVI**)...En...J²...Flm...Δ (1473)...Δ (**II**)...Du...Cin⁴...Cin⁵...A (3395)...*Annals Toulouse Obsy.* **III**...Furner and Storey (*Mon. Not.* **LXIV**, 444)...β⁶...]

$35^{m}\ 22^{s}$ **1823.** A. G. 72. "Close double?" in *A. G. Camb.* Measures by Miller at Kirkwood Observatory.

35 26 **1824.** Σ 428 *rej.* The 40-inch shows a 13 m star nearer A, 172°.7 : 21″.5.

1904.92	141°.8	26″.15	2*n*	β⁶	8.9...10.6

35 30 **1825.** β 1182. Discovered with the 36-inch. Batterman (*A. N.* 3507) gives the proper motion of this star, 0″.028 in the direction of 186°.1.

A and B

1898.71	260°.4	4″.45	1*n*	Hu

A and C

1898.71	242°.8	18″.76	1*n*	Hu

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...]

35 56 **1826.** Σ 435. (= H III. 88.) Unchanged.

1866.37	1°.8	12″.95	3*n*	Δ
1904.76	2.4	12.95	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...β⁶...]

1827. Σ 434. (= S 434.) By a singular coincidence this pair has the same number in Struve and South. Distance increasing, with very little change in the angle. The motion is rectilinear, and about 0″.03 annually. $36^{m}\ 6^{s}$

1865.37	87°.2	29″.56	6*n*	Δ
1868.69	87.1	29.58	5*n*	Du
1887.71	87.5	30.29	2*n*	T
1903.76	85.7	30.57	3*n*	β

[Ma (*F. S.* **II**)... Ra (**XXVIII**)... Du ...WS²...Flm...Δ (**II**) ...T (2988)...HΣ (**XII**)...β⁶...]

1828. OΣ 61 *rej.* Excluded as single in the *Poulkowa Catalogue* of 1850. Se in 1859 found it single or doubtful. It was first measured by Dembowski. There is no evidence of change in the position of the small star, and probably the failure to see it can be explained by unsuitable conditions. 36 19

1877.94	127°.8	1″.87	1*n*	β
1884.30	123.5	1.60	4*n*	Per
1898.83	124.5	1.77	3*n*	Hu

[Se...Δ (I)...Per...Per (2684, 2749)...β¹...Sk⁴...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

1829. Σ 438. Fixed. 36 27

1868.84	241°.9	1″.80	4*n*	Δ
1879.66	240.3	1.80	1*n*	Cin
1904.83	242.1	1.82	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Δ (**II**)...Cin⁶...]

1831. Hu 103. The only other measure is: 36 37

1903.11	209°.5	0″.89	1*n*	Lewis

[Hu (*A. J.* 485)...Lewis (*Mon. Not.* **LXIV**, 791)...]

1832. Σ 437. (= H III. 37.) Without change. 36 39

1868.73	129°.9	11″.24	4*n*	Δ
1880.83	130.0	11.43	3*n*	β
1903.79	129.2	11.23	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...β³...β⁶...]

1834. *o* (38) *Persei.* β 535. Discovered with the 18½-inch. The measures are not very accordant, but the motion, if any, is very slow. Auwers gives the annual movement of this star, 0″.015 in the direction of 194°.3. It is obvious from the measures that the two stars are moving together. Some of the later measures are: 36 47

1877.84	60°.5	0″.96	1*n*	Δ
1888.42	51.1	0.97	5*n*	HΣ
1888.71	59.2	1.09	3*n*	β
1890.10	56.1	1.01	3*n*	T
1890.61	49.7	0.87	5*n*	Sp
1894.36	48.2	0.97	7*n*	HΣ
1901.74	50.7	0.90	4*n*	Gr. Obsy.

The large star is also a spectroscopic binary, discovered by W. S. Adams at the Yerkes Observatory (*Astrophysical Jour.* XV, 214).

[β (**X**)... β1... β2... β (2875)(*Pub. L. O.* **II**)... T (3186)... Big (*Bul. Ast.* **XII**, 299)... Sp (**III**)... HΣ (**XII**)... Lewis and Bryant (*Mon. Not.* **LX**, 496; **LXIII**, 403; **LXIV**, 791)...]

(See p. 1062)

37^{m} 3^{s} **1836.** **β** 880. (AC = **Σ** 439 = **H** **III**. 38.) The duplicity of the principal star of Σ 439 was discovered with the 18½-inch. It is near the last preceding pair, 38 *Persei*. Some of the later measures are:

A and B

1891.69	354°.7	0″.51	3*n*	β
1898.76	354.9	0.55	1*n*	β
1899.08	353.2	0.49	4*n*	Lewis
1902.15	15.7	0.58	3*n*	Lewis
1903.04	356.6	0.61	2*n*	Bryant

There is no change in the Struve companion:

AB and C (= Σ 439)

1866.85	38°.3	23″.39	3*n*	Δ
1879.82	38.0	23.70	2*n*	β
1891.69	38.3	23.42	3*n*	β
1898.82	38.2	23.46	2*n*	β
1903.79	38.1	23.40	2*n*	β

[β (**XIII**)... β3... β (3114)(*Pub. L. O.* **II**)... Ma (*F. S.* **I**)... Ma (**XIII, XV**)... Δ (**II**)... Cin6... Lewis, Bryant, and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXI**, 486; **LXIII**, 403; **LXIV**, 791)... β6...]

(See p. 1062)

37 4 **1837.** **Hn** —. Faint pair 41^{s} *p* 17 *Tauri*, and 5′ 5″ *s*; found by Holden with the 26-inch. The magnitude in DM is 9.5. The only other measures are:

1903.81	310°.0	5″.71	2*n*	β	9.6...9.7

[Hn (*Wash. Obsns.* 1875)... β6...]

37 8 **1838.** **Barnard** 3. Discovered by Barnard with the 12-inch at Lick Observatory. It is 37^{s} preceding and 47″ south of 17 *Tauri*.

1897.15	144°.9	1″.92	2*n*	A

[β (3114)(*Pub. L. O.* **II**)... A (3465)...]

37 19 **1839.** **β** 1041. (AB = **OΣ (App)** 38.) The minute companion to the preceding star of this wide pair was discovered with the 36-inch. The proper motion of the bright stars is given by Rechenberg (*A. N.* 3482) as follows:

A	0″.065 in 201°.8
B	0.331 in 123.3

From the position of the faint star given by the measures of 1888, with the above proper motion, the place of C in 1898.7 should be 335°.2 : 10″.44. It is evident from the later measures that this star is fixed in space, and that the two form only an optical pair. All the other measures of AB and BC are given.

B and C

1898.71	338°.8	10″.14	2*n*	β
1898.80	340.3	9.95	3*n*	A

A and B (= OΣ (App) 38)

1888.91	39°.9	123″.57	3*n*	β
1890.73	40.0	123.63	4*n*	Fr
1898.71	40.9	124.37	2*n*	β
1898.72	41.0	124.48	1*n*	A

[β (**XV**)... β (2929)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... Δ (**I**)... Franz (3464)... A (3584)...]

1840. **A. G.** 73. Double in *A. G. Lund*. Measures by β6. 37^{m} 22^{s}

1841. **β** 1183. Discovered with the 36-inch. A naked-eye star in *Perseus*. 37 36

1898.71	137°.4	6″.71	1*n*	Hu

[β (**XVII**)... β (3047)(*Pub. L. O.* **II**)... Hu (*Bul. L. O.* No. 44)...]

(See p. 1062)

1842. **Σ** 441 *rej.* From *Catalogus Novus*. The only measures are: 37 36

AB	1900.51	243°.5	19″.40	2*n*	Es	8.6... 9.3
AC	1900.97	114.2	22.03	1*n*	Es	...12

[Espin (3717)...]

(See p. 1062)

1843. γ *Camelopardali*. **H** 2200. The only observation since Herschel is: 37 41

1904.84	240°.5	56″.12	2*n*	β6	...12

1844. **Σ** 440. The *np* star of a wide pair. Probably fixed. 37 53

1868.03	230°.6	2″.74	3*n*	Δ
1897.42	228.2	2.65	5*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XIII**)... Δ (**II**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

1845. **Σ** 442. Unchanged. 37 55

1868.98	270°.4	2″.49	4*n*	Δ
1903.98	269.6	2.52	2*n*	β

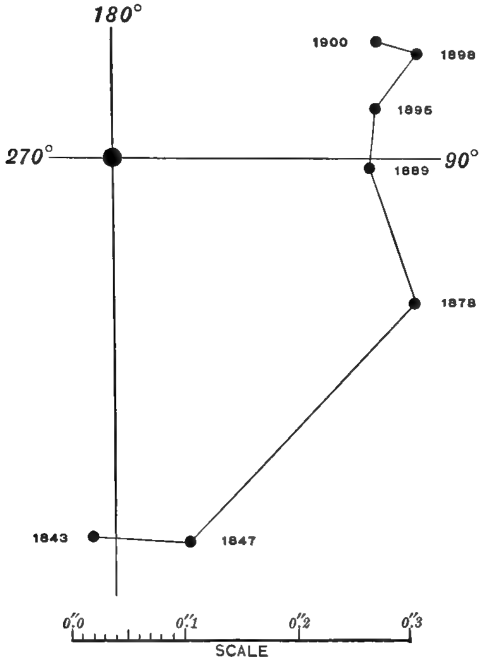
[Ma (*F. S.* **I**)... Ma (**XI**)... Se... Δ (**II**)... Cin6... β6...]

1848. 19 *Pleiadum*. **H** 3251. This star has a proper motion of 0″.033 in 199°.5 (*A. G. Berlin*), which appears to account for the change in the distance of B. 38 5

1880.22	329°.6	66″.37	3*n*	β	6.0... 9.7
1886.15	329.5	67.26	2*n*	Hl	
1903.74	329.5	67.48	2*n*	β	6.3...10.5

[Ra (**XXIII**).... Sadler (*Mon. Not.* **XXXIX**, 186).... β3.... Hl (**II**, p. E 39).... β6....]

38$^{\mathrm{m}}$ 8$^{\mathrm{s}}$ **1849.** **OΣ 62.** The motion is retrograde, and apparently the arc described is a little more than one quadrant, but further measures are needed to give even an approximate period. The only measures are:



OΣ 62

1843.31	357°.1	0″.34±	3*n*	Ma
1847.46	11.3	0.35±	2*n*	OΣ
1878.84	64.4	0.30	1*n*	β
1889.80	88.3	0.23±	2*n*	HΣ
1893.80	100.2	0.39	1*n*	Wilson
1895.14	109.0	0.25±	3*n*	Ho
1895.67	100.6	0.24	2*n*	Barnard
1898.55	108.8	0.29	3*n*	Hu
1900.24	113.7	0.26	1*n*	Hu
1904.26	124.9	0.29	2*n*	Biesbroeck

[OΣ (IX) ... Ma (XI) ... Δ (I, p. 227) ... β^{3} ... Wilson (   ) ... Barnard (*A. J.* 447) ... Ho (3558) ... HΣ (XII) ... Hu (*Pub. L. O.* V) ... Biesbroeck ...]

38 32 **1851.** **Lv 3.** Discovered by Leavenworth at the Haverford College Observatory. No motion

1900.05	359°.0	1″.13	3*n*	Hu

[Lv 1 ... LM ... Doolittle (*Pub. Flower Obsy.* I) ... Hu (*Bul. L. O.* No. 44) ...]

38 36 **1852.** **Howe 8.** From Cin^{6}. In the mean results of that list, the position angle is printed 173°.3 instead of 137°.3. The large star was suspected to be a close pair. Only rough place given in Cin^{6}, and hence it was identified and measured with the 40-inch. Both stars single with all powers.

1903.94	137°.2	27″.77	2*n*	β^{6}	8.3...11.5

1853. 15, *n*, *Pleiadum.* **Σ 444.** Probably no sensible change. The large star has a proper motion of 0″.057 in 151°.0 (*A. G. Berlin*). 38$^{\mathrm{m}}$ 43$^{\mathrm{s}}$

1866.16	336°.8	3″.23	3*n*	Δ
1879.66	335.1	2.80	1*n*	Cin

[Ma (*F. S.* I) ... Δ (II) ... Cin^{6} ...]

1854. **Σ 443.** (= **S 435.**) Very little relative change, but the stars probably form a physical system, as they have a large common proper motion. This movement is given: 38 47

Porter	1″.358 in 155°.0
Kustner	1.437 in 148.7

1851.87	44°.6	8″.89	2*n*	OΣ
1867.08	46.8	8.82	3*n*	Δ
1887.67	48.5	8.51	2*n*	T
1897.64	47.8	8.55	5*n*	Doo

Doolittle measures a 11 m star from A which had been previously observed by Tarrant only, who referred it to the mean of A and B.

1897.64	163°.3	39″.94	5*n*	Doo

[Ma (*F. S.* I) ... Wr ... OΣ (IX) ... Δ (II) ... Bl (V) ... T (2898) ... Glasenapp (IV) ... Doolittle (*Pub. Flower Obsy.* I) ...]

(See p. 1062)

1855. **H 3588.** The only measures from the Kirkwood Observatory: 38 59

1904.83	229°.0	48″.51	2*n*	Miller	8.9...10.2

1856. **β 536.** (AC = **S 437.**) The wide pair, first observed by South, is in the *Pleiades*, 1$^{\mathrm{m}}$ 15$^{\mathrm{s}}$ *p Alcyone*, and 4′ 52″ *n*. The close pair and the faint star D were discovered with the 18½-inch. It is a physical system, and it is probable that the period will not be a long one. These stars have some proper motion, which is given by Battermann: 39 8

A = 0″.034 in 126°.1
C = 0.024 in 34.5

This appears to account for the increasing distance of C. Barnard has added a 16m companion to C nearer than D, 329°.8 : 7″.76 (1899.65) 3*n*.

A and B

1878.69	336°.4	0″.44	3*n*	β	8.3...9.3
1890.81	322.4	0.19	3*n*	β	8.0...8.5
1891.74	317.1	0.19	3*n*	β	8.5...8.9
1892–93	Single with 36-in.		2*n*	Barnard	
1899.70	301.6	0.15	3*n*	A	
1902.05	292.2	0.17	2*n*	Bryant	

C and D

1878.67	11°.2	18″.17	1*n*	β
1891.74	9.4	18.35	3*n*	β
1894.09	10.0	17.98	2*n*	Wilson
1898.89	8.2	18.02	1*n*	A

AB and C (= S 437)

1823.99	299°.7	34″.57	2*n*	S
1878.70	302.4	36.72	2*n*	β
1891.74	303.1	36.92	3*n*	β
1894.05	303.1	36.84	3*n*	Wilson
1898.89	303.3	37.47	1*n*	A
1904.94	303.5	37.13	2*n*	β

[β (X) . . . β^1 . . . β (3048, 3114) (*Pub. L. O.* **II**) . . . Barnard (*A. J.* 447) . . . Wilson ( ) . . . A (*Bul L. O.* No. 11) . . . Lewis and Bryant (*Mon. Not.* **LX**, 496; **LXII**, 383; **LXIII**, 403; **LXIV**, 791) . . . β^6 . . .]

39^m 12^s **1858.** 23 *Tauri.* "A close faint star *np* suspected" by the Harvard observers. Not given in *Harvard Annals* XII. I have examined this star many times with large apertures, but never have seen any close star. The large star has a proper motion of 0″042 in 189°3 (*A. G. Berlin*).

39 17 **1859.** 29 *Tauri.* **H 2004.** The only later measures are by Cogshall at the Kirkwood Observatory:

1904.83	65°4	64″83	2*n*	Cg	6 . . . 12.2

39 20 **1860.** **H 1139.** The magnitude in DM is 7.4. This star has a proper motion of 0″056 in 208°9 (Schroeter). The only measures are:

1904.81	176°3	47″3	3*n*	Miller	9 . . . 10.2

39 23 **1861.** **Ku 15.** (AC = **H 665.**) Discovered by Kustner. No measures of C in H.

[Kustner (3821) . . .]

39 25 **1863.** **Hu 546.** Later measures show change in angle.

1902.72	57°0	0″26	3*n*	Hu

[Hu (*Bul. L. O.* No. 27) . . .]

39 28 **1864.** **OΣ 63.** Apparently fixed.

1867.63	269°2	6″88	3*n*	Δ
1898.67	269.9	7.18	3*n*	Hu

[OΣ (**IX**) . . . Δ (I) . . . Hu (*Pub. L. O.* **V**) . . .]

39 45 **1865.** **S 436.** (= σ 104 = OΣ (App) 39.) Unchanged. The larger star has a proper motion of 0″039 in 156°6 (Battermann).

1860.20	74°7	58″34	2*n*	OΣ	7.0 . . . 7.8
1875.83	74.8	58.55	3*n*	Δ	5.9 . . . 6.6
1883.31	74.8	58.22	4*n*	Franz	

[OΣ (**X**) . . . Δ (I) . . . Franz (2649) . . . β^2 . . . Espin (*Mon. Not.* **LXIV**, 678) . . .]
(See p. 1062)

39 54 **1866.** **β 537.** Discovered with the 18½-inch. In the *Pleiades.* Apparently unchanged. The following are all the other measures:

1877.84	194°4	0″37	2*n*	Δ
1890.88	184.8	0.48	3*n*	β

[β (**X**) . . . β^1 . . . β (3048) (*Pub. L. O.* **II**) . . . Δ (I) . . .]

40 6 **1868.** **Σ 451** *rej.* From H (VIII). Magnitudes in Σ, 8 . . . 8–9. The larger is SD (13°) 733.

1879.74	321°5	20″06	1*n*	Cin	8.0 . . . 8.5
1904.00	323.4	19.64	2*n*	β	8.5 . . . 9.3

[H (**VIII**) . . . Cin^6 . . . β^6 . . .]

1869. **Σ 447.** Slow change, and evidently from proper motion. 40^m 8^s

1836.11	176°7	26″62	2*n*	Σ
1850.60	175.0	26.91	2*n*	OΣ
1866.91	172.6	27.09	4*n*	Δ
1891.99	169.7	27.81	2*n*	HΣ
1903.76	168.3	28.04	3*n*	β

[Ma (*F.S.* I) . . . OΣ (**IX**) . . . K (1519) . . . Δ (2194) . . . Δ (**II**) . . . Flm . . . Sk^3 . . . HΣ (**XII**) . . . β^6 . . .]

1870. **H 5457.** "Agrees in Decl. with Σ 448, but R. A. differs by a whole minute, and the angle by 76°." As will be seen, it is really identical in place with Σ 448. This companion looked for with 6-inch and 18½-inch, but only Σ's seen. There is no other bright star near. I have no doubt there is further error in H of 90° in angle, making it identical with the Σ companion. 40 14

1871. **Σ 448.** There is no change in the position of the small star since Σ (see No. 1870). This pair is not identified in Hl, and is given with an erroneous declination. 40 16

1868.30	16°8	3″17	4*n*	Δ
1889.94	17.7	3.25	2*n*	Hl

[Ma (*F. S.* I) . . . OΣ (**IX**) . . . Wr . . . Se . . . Du . . . Hl (**II**) . . . Δ (**II**) . . . Ebell (3321) . . .]

1872. **Σ 449.** Unchanged. 40 16

1866.56	330°7	6″70	3*n*	Δ
1904.84	330.5	6.75	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI**) . . . Δ (**II**) . . . β^1 . . . β^6 . . .]

1873. *Tauri* 79. **Σ 450.** No material change. Erroneously called OΣ 64 in Ba (II). 40 17

1868.09	265°6	6″03	4*n*	Δ
1904.82	266.7	4.97	3*n*	Miller
1904.93	267.0	5.94	3*n*	β

[Ma (*F. S.* I) . . . Ma (**XI**) . . . Ba (**II**) . . . Δ (**II**) . . . β^6 . . .]

1875. *η Tauri.* **Σ 8, App. I.** (= σ 106 = **S 438.**) No material change. B is 24 *Tauri.* A has a proper motion of 0″040 in 187°8 (*A. G. Berlin*). 40 21

A and B

1868.80	289°3	117″27	5*n*	Δ	3.0 . . . 6.1
1879.93	289.4	117.11	6*n*	Je	
1903.87	289.3	117.27	3*n*	β	

A and C

1868.80	311°9	180″84	4*n*	Δ	. . . 7.6
1903.89	311.9	180.92	2*n*	β	

A and D

1868.80	295°3	190″74	4*n*	Δ	. . . 8.2
1903.89	295.3	190.37	2*n*	β	

[P^1 . . . Ra (**XXVIII**) . . . Pk . . . Se^1 . . . Δ (**II**) . . . Je (2329) . . . Hl (**II**) . . . Maibckato (*Obsns.* 1892) . . . Glasenapp (**II, III**) . . . β^6 . . .]

10^{m} 25^{s} **1877.** **Σ 446.** (AC = **Espin 12.**) Unchanged. In Cluster VIII, 80. Faint star discovered by Espin. The principal star has a proper motion of 0″048 in 221°7 (Battermann).

1866.80	254°4	8″54	3*n*	Δ
1903.74	253.0	8.48	2*n*	β

The only other measure of C is:

1903.74	36°8	11″56	2*n*	β	...13.5

[Ma (*F. S.* I)...H (V)...Δ (**II**)...Espin (*Brit. Ast. Ass'n* **III**, 227) (*A. N.* 3717) ...β6...]

40 25 **1878.** **β 1003.** Discovered with the 12-inch. There may be some change in the angle. Boothroyd suspected the principal star to be a close pair, 15°:0″4.

1881.54	20°5	2″69	2*n*	β	8.1...12.0
1892.01	30.4	2.48	3*n*	β	8.2...11.3
1898.97	34.4	2.76	2*n*	Bd	8.0...13.2

[β (**XIII**)...β3...β (3114) (*Pub. L. O.* **II**)...Boothroyd (*A. J.* 478)...]

40 39 **1879.** **Σ 445.** Unchanged.

1866.79	255°3	3″00	3*n*	Δ
1904.75	257.9	2.96	3*n*	Miller

[Ma (*F. S.* I)...Δ (**II**)...]

40 51 **1880.** **β 538.** A pair of faint stars in the *Pleiades*, $30^{s}.4$ *f* and 20″5 *s* of *η Tauri* (Alcyone). Not in DM.

1898.89	130°0	1″94	2*n*	β
1899.31	129.4	1.68	2*n*	A
1900.38	131.6	1.78	6*n*	Doo

[β (**X**)...β1...A (3638)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**)...Lewis (*Mon. Not.* **LXII**, 383)...]

41 1 **1881.** **H 2203.** The only later measures are from the Kirkwood Observatory:

1904.78	72°4	34″54	3*n*	Cg	9.0...11.0

41 14 **1882.** **β 1184.** Discovered with the 36-inch. Probably without change.

1896.08	267°8	0″5±	4*n*	Sp
1897.88	266.3	0.73	3*n*	A
1900.96	269.4	0.53	3*n*	Doo
1901.05	269.5	0.51	6*n*	Gr. Obsy.
1903.47	274.1	0.50	4*n*	Bowyer

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...Sp (**III**)...A (*A. J.* 429)...Innes (*Mon. Not.* **LXI**, 416)....Doolittle (*A. J.* 547)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXII**, 383; **LXIII**, 403; **LXIV**, 791)...]

41 26 **1883.** **β 1105.** Difficult pair in the *Pleiades*, $1^{m}\,4^{s}$ *f* and 4″3 *n* of *η Tauri* (Alcyone). Discovered with the 36-inch. The only later meaure is:

1899.70	46°4	0″32	2*n*	A

[β (**XVI**)...β (2956) (*Pub. L. O.* **II**)...A (3638)...]

41 35 **1884.** **H 2200.** The general similarity between this and Σ 462 suggested an error of 5^{m} in H's R. A., making it identical with Σ 462, and this is confirmed by a recent examination (1903) with the 40-inch. There is no pair in Herschel's place.

41^{m} 35^{s} **1885.** **OΣ 516.** Unchanged.

1871.90	40°0	2″21	5*n*	Δ
1898.54	41.4	2.19	4*n*	Hu

[OΣ (**IX**)....Δ (I)....Ho (2978)....Hu (*Pub. L. O.* **V**)....Bowyer (*Mon. Not.* **LXII**, 383)...]

41 41 **1886.** 30 *Tauri.* **Σ 452.** (= **H III. 68** = **S 439.**) Unchanged. The proper motion is small, 0″022 in 199°3 (Auwers).

1864.53	59°3	8″96	3*n*	Δ
1904.76	60.9	8.84	3*n*	Cogshall

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Se...Pk...Δ (**II**)...*Annals Toulouse Obsy.* **III**...]

42 1 **1887.** 27 *Tauri.* **Σ 453.** Σ observed this star twice as a close pair, but in all the later observations down to 1836 it was found to be single. It has never been seen double since with the largest apertures. Wn (2074) states that the occultation of this star, January 7, 1876, was observed by Hartwig to be not quite instantaneous, though not known by him to have been entered as double by Σ. Glasenapp thought it elongated in 1892. I have examined this star many times in the last twenty years with apertures up to 36 inches, but never at any time suspected the least elongation. It has a proper motion of 0″047 in 185°0 (*A. G. Berlin*). Hall in his measures of the *Pleiades* measures several distant small stars.

[Ma (*F. S.* I)...Ma (**IX, XI**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...Hl (**II**)...Δ (1736)...β1...Glasenapp (**II**)...]

42 10 **1888.** **Σ 456** *rej.* From H (V).

1879.66	118°9	21″80	1*n*	Cin	8.5...9.5
1904.76	119.2	22.16	3*n*	M	8.5...9.1

Cin5...Miller ( )...]

42 12 **1889.** **OΣ (App) 40.** This is P III. 164. The only other measure is:

1902.71	308°2	86″96	3*n*	β6

42 14 **1890.** **Ho 324.** Without change.

[Ho (3233, 3558) (*A. J.* 215)...] (See p. 1062)

42 23 **1892.** **H 2209.** The only measures are from the Kirkwood Observatory.

1904.85	272°2	14″67	2*n*	Cogshall	10.7...14

42 29 **1893.** **H —.** A pair of faint stars observed by H (VI) near Σ 458. Not in DM.

1903.88	1°6	8″99	1*n*	β6	10.8....12.0

42 30 **1894.** **Kr 21.** Noted as double in *A. G. Hels.*

1900.07	279°5	4″65	3*n*	Es

[β (3042) (*Pub. L. O.* **II**)...Espin (3717)...]

42^{m} 44^{s} **1895.** **Σ 458.** Fixed.

1866.89	17°3	5″01	3*n*	Δ
1903.87	17.8	4.76	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...β^6...]

42 49 **1896.** **A. G. 74.** Measures from *A. G. Leipzig*.

1903.21	195°0	11″25	2*n*	Cogshall

42 50 **1897.** **OΣ 64.** **B. A. C. 1188.** In the *Pleiades.* No change in either companion. The pair measured in Ba (I) as OΣ 64 is Σ 450.

A and B

1867.81	239°3	3″25	3*n*	Δ
1898.68	238.1	3.25	3*n*	Hu

A and C

1867.31	236°5	10″40	4*n*	Δ
1898.68	236.6	10.38	3*n*	Hu

[OΣ (**IX**)...Hd...Ba (**II**)...Per...Per (2749)...Δ (**I**)...T (3186)...Hu (*Pub. L. O.* **V**)...]

42 58 **1898.** **β 1106.** A difficult pair in the *Pleiades*, discovered with the 36-inch. It is too faint for the DM. The place is taken from the Paris map of this group. It is 55^s *f* and 4′6 *n* of 28 *Tauri* (Pleione). The only other measure is:

1899.69	19°6	0″35	1*n*	A

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3638)...]

43 6 **1900.** **OΣ 65.** This is a binary, and may be in rapid motion, but the observations are too scattering to decide with certainty. If this star has really been single at any time during the period covered by the observations, it would indicate that the plane of the orbit is nearly in the line of sight, since the measures show very little change in the angle, and that about one revolution has been completed since the first measure by OΣ. All of the observed places of the smaller star are in the third quadrant, and it would appear to be non-measurable when it is on the opposite side.

The following are most of the principal measures:

1846.16	209°2	0″74	4*n*	OΣ
1847.88	202.8	0.66	2*n*	Da
1852.14	204.3	0.66	2*n*	Ma
1859.05	201.3	1.03	2*n*	Se
1865.87	195?	....	1*n*	Δ
1869.67	Single		1*n*	Δ
1871	Single			Du
1882–3	Uncertain			En
1883.92	Single		2*n*	Per
1887.59	196.4	0.24 ±	9*n*	Sp
1889.06	198.5	0.29	2*n*	Hl
1889.29	198.5	0.45	4*n*	HΣ
1893.80	199.3	0.62	1*n*	Wilson
1897.16	201.2	0.68	6*n*	A
1897.40	201.5	0.60	5*n*	Hu
1903.83	203.6	0.60	2*n*	A
1904.17	205.4	0.65	1*n*	Biesbroeck

[OΣ (**IX**)...Ma (**XIII**)...Flm...En (2678)...Per...Per (2684)...Δ (**I**, p 227)...Hl (**II**)...Big...Se...Da^3...Glasenapp (**II**)...Sp (**III**)...Wilson ( )...Big (*Bul. Ast.* **XII**, 299)...Sk^4...Knorre (3518)...Brown (3645)...Lewis (*Mon. Not.* **LIX**, 400)...HΣ (**XII**)...A (3395, 3638)(*A. J.* 429)(*Bul. L. O.* No. 11)...Hu (*A. J.* 397, 427)(*Pub. L. O.* **V**)...Biesbroeck...]

(See p. 1062)

1901. **β 539.** Discovered with the 18 ½-inch. Near β 401. The later measure shows no motion. 43^{m} 13^{s}

1891.86	271°6	2″69	2*n*	β	8.3...10.6
1904.95	276.3	2.80	1*n*	β	

[β (**X**)...β1...β (3114)(*Pub. L. O.* **II**)...β^6]

1902. **H 666.** Companion readily seen with 6-inch, 1876. The estimates of the magnitude of A differ widely. 43 15

1900.68	18°7	30″78	2*n*	β^5	6.5...12.7

1903. **Σ 457.** Apparently no motion. Σ speaks of a third star, 347° : 32″, which I failed to see on one night with the 6-inch. 43 15

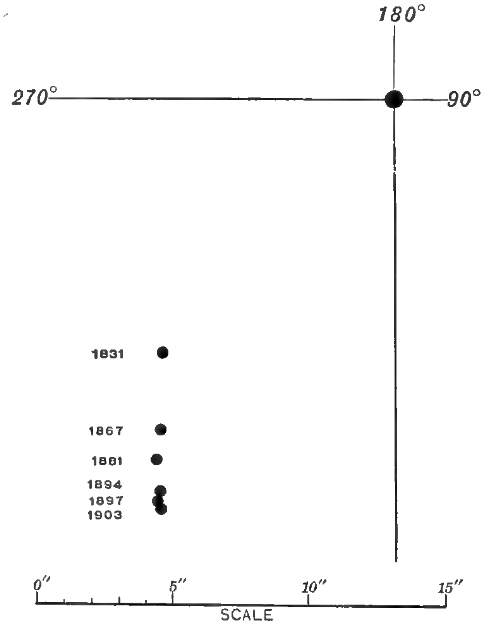
1866.93	101°7	1″21	3*n*	Δ
1901.81	100.7	1.16	2*n*	β

The only measure of the distant star is:

1901.81	338°8	18″20	2*n*	β	...12.6

[Ma (*F. S.* **I**)...Δ (**II**)...Glasenapp (**II**)...β^5...]

1905. **Σ 459.** The change seems to be from proper motion. The measures of the companion give an annual movement of A of 0″065 in about 180°. The following are all the measures. Some of the distances are evidently not very exact. 43 33



Σ 459

1831.38	318°.3	12″.84	3*n*	Σ
1845.00	318.4	12.88	1*n*	Ma
1867.78	325.4	15.11	4*n*	Δ
1881.18	327.0	16.11	1*n*	Pt
1894.14	329.3	16.95	2*n*	HΣ
1897.13	327.7	16.80	2*n*	A
1897.60	329.9	17.39	5*n*	Doo
1903.12	330.5	17.77	2*n*	Do
1903.87	330.6	17.53	2*n*	β

[Ma (*F. S.* **I**)...Δ (1735)...Δ (**II**)...Flm...Pt...A (3465)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...Do (3930)...β^6...]

44m 0s **1906.** **OΣ 66.** Apparently fixed.

1870.22	134°.6	0″.53	6*n*	Δ
1898.27	137.6	0.77	4*n*	Hu
1902.67	138.4	0.67	2*n*	Gr. Obsy.

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXIII**, 403; **LXIV**, 791)...Hu (*Pub. L. O.* **V**)...]

44 10 **1907.** **β 401.** Discovered with the 6-inch. No motion.

1878.91	255°.8	4″.18	2*n*	Cin
1891.86	256.0	4.64	2*n*	β
1904.93	254.3	4.50	2*n*	β

[β (**VII**)...β (2103, 3114) (*Pub. L. O.* **II**)...Δ (**I**)...Cin^5...Cin^6...β^6...]

44 15 **1908.** **H 667.** I did not see any third star. Not in SD.

1901.73	90°.4	12″.52	2*n*	β^5	10.5...12.7

44 36 **1909.** **H 3248.** Given originally with R. A. 20m less, and corrected later. The only measures are:

1903.86	26°.4	6″.66	2*n*	β^6	9.5...10.0

44 44 **1910.** **H 668.** The only measures are:

1901.73	298°.5	21″.50	2*n*	β^5	8.5...10.5

44 44 **1911.** **See 33.** The place of this star is erroneous. It is the same as H 3601, which is 1° south, and about 2m *f* (No. 1920).

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

44 56 **1912.** **H 3253.** The only measures since H are:

1904.83	73°.8	31″.49	3*n*	Cogshall	8.1...9.8

44 57 **1913.** **Σ 455.** Fixed. The larger star is given a proper motion of 0″.097 in 109°.2 (Schroeter).

1866.90	166°.5	11″.84	3*n*	Δ
1904.78	166.1	11.80	3*n*	Miller

[H (**IV, V**)...Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Δ (**II**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...]

1915. **Σ 463.** No sensible change. 45m 26s

1867.89	201°.5	10″.76	4*n*	Δ
1879.65	200.7	10.73	3*n*	β
1904.83	199.5	10.39	2*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...]

1916. **H 3599.** Another observation, 76″.8 : 12″ ± : 8...9. 45 49

1904.75	73°.1	12″.25	3*n*	Cogshall	8.5...10.0

1917. **Σ 461.** Change is uncertain. 45 51

1866.58	105°.5	1″.38	3*n*	Δ
1904.77	113.5	0.99	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...] (See p. 1062)

1918. **H 2208.** Measured by Cogshall at the Kirkwood Observatory. 46 9

1904.83	145°.5	15″.27	2*n*	Cg	8.5...13

1919. **H 3602.** Measured at the Kirkwood Observatory. 46 23

1904.86	345°.9	8″.12	2*n*	Miller	9.5...10.7

1920. **H 3601.** (= **See** 33.) There is an error of 1° in the place given by See (No. 1911). 46 31

1901.78	300°.0	10″.58	2*n*	β^5	7.2... 9.5

1921. ζ *Persei.* **Σ 464.** (= **S** 441; ADE = **H VI. 96.**) The small star C forms H 337, and is not in Σ. No change in AB. The large star has no sensible proper motion, 0″.005 in 212°.6 (Auwers). 46 35

A and B

1867.77	206°.7	12″.69	4*n*	Δ	
1880.04	207.7	12.76	3*n*	ϐ	
1903.81	208.6	12.63	3*n*	β	

A and C

1880.35	286°.6	32″.60	3*n*	β	...11.1
1903.81	287.0	32.57	3*n*	β	

A and D

1880.94	198°.0	89″.12	1*n*	β	... 9.3
1903.81	197.7	90.45	2*n*	β	

A and E

1881.00	185°.1	119″.49	1*n*	β	...10.0
1903.81	184.8	119.53	1*n*	β	

[Ma (*F. S.* **I**)...Da^1...Ma (**XI, XIII**)...β^2...β^3...Pk...Δ (**II**)...Hl (**II**)...Kn ...Ho (3558)...β^6...]

1922. **β 743.** Discovered with the 6-inch in 1879 at Mt. Hamilton. 46 36

1891.77	246°.1	0″.74	3*n*	β	8.2... 9.0
1901.07	249.5	0.71	3*n*	Doo	

[β (**XI**)...β^2...β^3...β (3114) (*Pub. L. O.* **I, II**)...Doolittle (*A. J.* 547)...]

46^m 42^s **1923.** Σ 462. An observation by H (V) belongs to a faint pair in the field *f* (see No. 1934). Σ 462, though noted as very difficult by Ma and Gl, I found very easy with the 6-inch in 1876. Not in DM, but near DM (51°) 804. Without change in angle or distance.

1867.40	319°5	7″86	3*n*	Δ	10.0...11.5
1901.73	319.2	8.11	2*n*	β	9.6...10.0

[Ma(*F. S.* **I**)...Ma(**XII, XV**)...Δ(**II**)...Gl...β^5...]

46 47 **1924.** 30 *Eridani.* **H** 338. In 1865 Δ (1475) thought the large star elongated, and duplicity was suspected by Wn. I always found it round with the 6-inch in 1874 and later, and after that with the 18½-inch, and still later with the 36-inch in 1890. There is therefore very little probability of its being really double. No evidence of change in the Herschel companion. The principal star has a proper motion of 0″033 in 258°0 (Auwers).

1863.85	136°8	8″28	1*n*	Wn	
1864.45	135.2	8.17	4*n*	Δ	...10.5
1877.97	135.3	8.34	1*n*	β	
1899.11	134.8	8.15	2*n*	A	...10.2

[Wn(1738]...Δ(1475)...Δ(**I**)...β^1...β(3048)(*Pub. L. O.* **II**)...A(3638)...]

46 48 **1925.** **Hn** 66. From *Pub. Washburn Obsy.* II. Comstock gives this star a proper motion of 0″16 in the direction of 102°. Without change.

1903.98	34°1	2″25	2*n*	β

[Com(**VI**)...β^6...]

46 52 **1926.** **H** 669. "A third star 10 m makes nearly an isosceles triangle." The only measures are from the Kirkwood Observatory by Miller:

AB	1904.83	262°7	10″98	3*n*	M	9.4...9.5
AC	1904.93	197.5	46.98	3*n*	M	...9.6

46 55 **1927.** *Camelopardali* 9 (**Hev.**). **OΣ 67.** **B. A. C. 1204.** A fine pair, but little change, if any; a small common proper motion.

1868.71	44°1	1″94	5*n*	Δ
1877.26	42.2	1.72	1*n*	OΣ
1883.58	41.2	2.24	4*n*	En
1898.18	45.7	1.92	5*n*	Hu

[Ma(**XI**)...OΣ(**IX**)(**X**, p. 190)...Δ(**I**)...Flm...Sk^3...En(2678)...Maw(**II**)... Big(*Bul. Ast.* **XII**, 299)...Hu(*Pub. L. O.* **V**)...]

47 4 **1929.** **β** 1276. (AB = **Σ** 468 = **H** 5458.) Discovered with the 40-inch. It is not a difficult pair, and should have been seen before with the present distance. A and B are respectively SD (2°) 745 and 746. The only later measures of the close pair are:

1900.09	81°9	1″01	3*n*	A	9.4...10.2
1900.76	80.9	0.88	3*n*	Doo	9.3...10.3

There is no change in the Struve components since the first measures:

A and BC

1823+	105° ±	25″ ±	1*n*	H
1831.40	97.7	20.06	3*n*	Σ
1868.57	98.0	20.03	4*n*	Δ
1898.73	97.7	20.13	3*n*	β
1900.76	98.0	19.98	3*n*	Doo

[Ma(*F. S.* **I**)....Δ(**II**)....Cin^6....Glasenapp(**II**)....A(*Bul. L. O.* No. 11).... Doolittle(*Pub. Flower Obsy.* **I**)...]

1930. **Σ 466.** Without change. 47^m 8^s

1866.61	61°3	8″10	3*n*	Δ
1879.65	61.6	8.00	3*n*	β
1904.85	59.4	7.78	2*n*	Miller

[Ma(*F. S.* **I**)...Ma(**XI**)...Δ(**II**)...β^3...T(2991)...Glasenapp(**II**)...]

1933. 43 *Persei.* **S** 440. (= **H** V. 41 = σ 109.) No relative motion, but the small star is moving with the other. The proper motion of 43 *Persei* is given: 47 41

Porter	0″155 in 147°6
Bossert	0.151 in 149.5
Rogers	0.151 in 141.8

There is a nearer star, 12.5 m, in the direction of 279°.

1863.07	29°7	75″15	4*n*	OΣ	5.5...10.3
1888.19	30.0	75.34	2*n*	Eng	
1901.74	30.1	75.37	3*n*	β	

[OΣ(**X**)...Engelhardt(*Obsns. Ast.* Part 2)...β^5...]

1934. **H** —. Observed by H (V) for Σ 462. Examined and identified; in DM 9.5 m. 47 43

1936. **Ho** 325. Principal star variable (*Pop. Ast.* VI, 247). 47 53

1904.84	11°5	22″51	2*n*	Cg	6.5...13

[Ho(3233)...Cogshall( )...] (See p. 1062)

1937. **Σ** 465. Companion invisible to Δ 1864.77; and seen with difficulty 1865.87. I found it easy with the 6-inch in 1874. The only measures since Σ are: 48 4

1845.85	231°1	5″56	1*n*	Ma
1890.11	233.7	5.74	3*n*	T
1904.28	233.2	5.66	2*n*	β

[Ma(*F. S.* **I**)...Δ(1736)...T(3185)...β^6...]

1938. **OΣ (App)** 41. B is W^1 III^h 899. No change. 48 6

1901.07	357°2	59″02	3*n*	β	7.0...8.5

[Δ(**I**)...β^5...]

1939. 32 *Eridani.* **Σ** 470. (= **H** II. 36 = **Sh** 38.) Fixed. The bright star has a proper motion of 0″028 in 96°0 (Auwers), and the companion is moving with it. 48 16

1865.58	347°2	6″84	3*n*	Δ
1890.86	346.7	6.62	4*n*	Gla
1901.92	348.6	6.30	4*n*	Do
1904.85	346.3	6.93	2*n*	Cogshall

[Ma (*F. S.* **I, II**)...Ma (**XI**)...Ba (**I, II, III**)...Da^1...Da^2...Da^3...Fl...Bp...WJ...P^1...Wr...Wr (*Phil. Trans.* 1851)...Se...Se^3...Ra (**XXI**)...Δ (1118)...Δ (**I, II**)...Hd...WS...Gl...Du...Sk^2...Wn (**V**)...Pl...Cin^4...Cin^5...Je (2329)...Sp (**II**)...Goldney (2257)...Pk...β^2...Per...Per (2748)...En (2663)...T (2866)...Wilson (Cin^{10})...Hayn (3051)...Giacomelli (**I**)...Maw (**I**)...Glasenapp (**II, III**)...Scott (*Brit. Ast. Ass'n* **V**, 75)...Solá (3563)...*Annals Toulouse Obsy.* **III**...Do (3798)...]

48^{m} 21^{s} **1940.** **β 540.** Discovered with the 18½-inch. The only later observations are:

A and B

1891.69	324°7	1″28	3*n*	β

A and C

1891.69	57°3	57″11	3*n*	β

[β (**X**)...β^1...β (3114) (*Pub. L. O.* **II**)...]

(See p. 1062)

48 31 **1941.** **A 461.** A 16 m star, 249°0 : 15″5.

[A (*Bul. L. O.* No. 50)...]

48 34 **1943.** **β 85.** Discovered with the 6-inch. There is no evidence of motion.

1883.53	220°2	4″48	6*n*	En
1891.81	217.2	4.00	3*n*	β
1900.80	217.3	4.23	3*n*	Doo

[β (**II**)....β (*Mon. Not.* **XXXIII**, 437)....β (3114) (*Pub. L. O.* **II**)....Δ (**I**)...En (2678)...Doolittle (*Pub. Flower Obsy.* **I**)...]

48 50 **1944.** **β 263.** Discovered with the 9.4-inch at the Dartmouth College Observatory. No motion.

1882.95	76°1	0″80	5*n*	En
1898.80	74.4	0.88	3*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (**I**)...En (2678)...Big (*Paris Obsns.*, 1883)...A (3584)...]

48 53 **1945.** **β 541.** Discovered with the 18½-inch. Without change.

1898.72	260°2	1″33	2*n*	β
1899.90	262.4	1.42	2*n*	Doo

[β (**X**)...β^1...Cin^5...Wilson (Cin^{10})...Doolittle (*Pub. Flower Obsy.* **I**)...]

48 54 **1947.** **Hn 67.** From *Pub. Washburn Obsy.* II. Probably fixed.

1888.34	157°7	3″12	3*n*	Com	8.2...9.0
1901.96	150.2	2.73	3*n*	Do	

[LM...Com (**VI**)...Do (3798)...]

49 6 **1948.** *Persei* 189. **Σ 469.** No material change.

1868.05	148°9	8″81	4*n*	Δ
1904.84	147.5	8.67	2*n*	Cogshall

[Ma (*F. S.* **I**)...Δ (**II**)...β^3...]

49 31 **1949.** **H 1140.** The only measures are:

1904.83	117°4	18″63	3*n*	Miller	9.0...9.4

1950. ε *Persei.* **Σ 471.** (= **H** **II. 22** = **Sh** 39.) Fixed. The proper motion of the large star is given 0″025 in 158°1 (Auwers). It is a spectroscopic binary, discovered by Frost and Adams (*Astrophysical Jour.* XIX, 152). 49^{m} 48^{s}

1868.40	10°2	8″67	4*n*	Δ
1889.10	9.1	8.93	3*n*	Hl
1904.93	10.8	8.55	3*n*	β

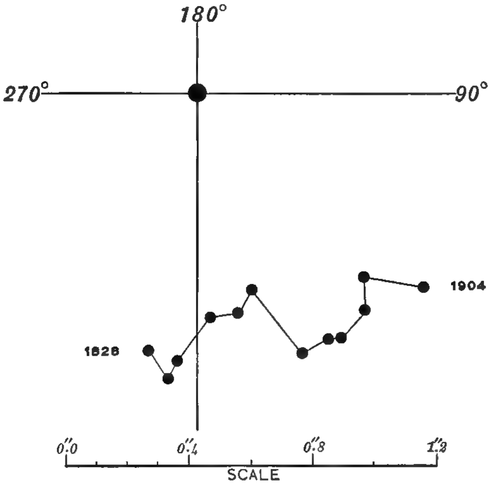
[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Da^1...Wr...Se^1...Ba (**II**)...Pl...Δ (1118, 1185)...Δ (**I, II**)...Hl (**II**)...En (2663)...Glasenapp (**II**)...Lewis (*Mon. Not.* **LX**, 496)...β^6...]

1951. **Hn 68.** Not in SD. No motion. 49 50

1904.85	178°0	8″36	2*n*	Miller	10...12

[*Pub. Washburn Obsy.* **II**, **VI**...]

1952. *Cephei* 49 (**Hev.**). **Σ 460.** **B. A. C. 1211.** Probably a binary of long period. So far there is no material change in the distance. The following measures are shown on the diagram: 49 57



Σ 460.

1828.28	349°5	0″84	2*n*	Σ
1832.64	354.6	0.92	3*n*	Σ
1836.45	355.8	0.86	3*n*	Σ
1848.60	3.5	0.72	3*n*	OΣ
1857.90	10.8	0.72	2*n*	Se
1862.95	15.7	0.66	7*n*	Δ
1868.01	22.3	0.90	4*n*	Δ
1874.27	28.3	0.90	5*n*	Δ
1879.14	30.6	0.91	2*n*	Hl
1888.14	37.9	0.89	2*n*	T
1893.94	42.4	0.80	6*n*	Com
1904.83	49.7	0.97	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**X, XV**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...En (1518, 1673, 2663)...WS...WS^2...Gl...Sk...Sk^3...Sk^4...Sk^5...Δ (1013, 1109, 1256, 1473, 1798, 2077)....Δ (**I, II**)....Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Hl (**I, II**)...T (2991)...Big...OΣ (**IX**) (**X**, p. 152)...Jones (*Pub. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Maw (**II**)...Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....Com (*Pub. Washburn Obsy.* **X**)...Morgan (*A. J.* 439)...Solá (3679)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

(See p. 1062)

50^m 21^s **1953.** **A 462.** (AC = β 542.) The principal star of β 542 was discovered by Aitken to be a very close pair with the 36-inch. No other measures of this. There is no change so far in the position of C, but doubtless hereafter the three stars will be found to make one system.

AB and C

1886.78	193°1	1″56	2*n*	LM	8.2... 9.0
1892.01	192.9	1.52	3*n*	β	8.4... 8.9
1898.88	192.5	1.50	3*n*	Cg	8.3...10.2
1903.80	190.6	1.56	3*n*	A	8.6... 9.5

[β (**X**)...β^1...β (3114) (*Pub. L. O.* **II**)...LM... Cogshall (*A. J.* 478)...Doolittle (*A. J.* 547)...A (*Bul. L. O.* No. 50)...]

50 29 **1954.** **Ho 220.** The only later measures are:

1904.86	108°5	1″84	2*n*	Cogshall	9...11.7

[Ho (2977)...] (See p. 1062)

50 53 **1957.** **Hn 69.** From *Pub. Washburn Obsy.*, II.

1904.85	188°3	2″10	2*n*	Cogshall

[Com (**VI**)...]

50 55 **1958.** **A. G. 75.** Double in *A. G. Camb.* Measures by Howard at the Kirkwood Observatory.

51 3 **1961.** **OΣ 68** *rej.* Excluded for distance in the *Poulkowa Catalogue* of 1850. Relatively fixed.

1898.14	175°5	39″26	2*n*	Hu

[Δ (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...]

51 25 **1962.** **β 543.** Discovered with the 18½-inch. This star has some proper motion:

Stumpe	0″283 in 228°3
Seeliger	0.284 in 224.1
Porter	0.279 in 232.7

It will be seen from the later measures that this movement belongs to both stars.

1891.75	28°4	11″19	3*n*	β
1898.70	28.8	11.02	2*n*	β
1898.86	26.8	11.00	3*n*	Cg
1903.75	27.6	10.80	3*n*	β

[β (**X**)...β^1...β (3114)...β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... Sp (**III**)... Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6....]

51 25 **1963.** **Σ 473.** Probably unchanged.

1867.46	94°7	16″43	3*n*	Δ	9.2...10.0
1879.36	94.0	16.62	3*n*	β	8.5... 9.4
1904.83	94.4	16.28	2*n*	M	9.1... 8.8

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...Miller ( )...]

51 26 **1964.** **Bird 1.** Discovered by Frederick Bird in 1872 at Birmingham (*Eng. Mech.* XVI, 336, 480). No early measures.

AB	1897.42	225°0	2″32	5*n*	Doo
AC	1897.42	173.3	9.37	5*n*	Doo

[Espin (*Mon. Not.* **LXII**, 403)...Doolittle (*Pub. Flower Obsy.* **I**)...]
(See No. 12968)

1966. **OΣ 69.** Unchanged. 51^m 41^s

1869.37	329°0	1″60	5*n*	Δ
1898.20	327.2	1.49	4*n*	Hu
1900.30	326.0	1.51	2*n*	β

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^6...]

1969. **Σ 475.** There is no change, but it would appear that the angle in Struve is too small. 52 3

1871.83	20°9	7″17	3*n*	Δ
1896.14	19.2	7.39	3*n*	A
1899.82	20.8	7.47	4*n*	Doo

[Ma (*F. S.* **I**)...Δ (**II**)...β^1...A (3395)...Doolittle (*Pub. Flower Obsy.* **I**)...]

1970. **Hn 70.** From *Pub. Washburn Obsy.*, II. The only other measures are: 52 11

1904.85	270°7	2″99	2*n*	Miller	9...10.2

[Com (**VI**)...] (See p. 1063)

1972. **Hn 71.** From *Pub. Washburn Obsy.*, II. 52 21

[Com (**VI**)...] (See p. 1063)

1974. **H 339.** The only measures are by Cogshall. He finds this star is not in the DM. 52 23

1904.84	219°7	31″26	2*n*	Cg	9.5...12

1975. γ *Eridani.* **H 3608.** The only measures are: 52 24

1877.88	238°4	51″93	2*n*	β^1	
1900.72	241.6	52.74	2*n*	β^5	...13.2

The large star has a proper motion of 0″118 in 158°3 (Bossert), which corresponds to the change in the small star.

1977. **β 1042.** Discovered with the 36-inch. So far there appears to be no change in the close pair. Doolittle measures a 11 m star, 250°8:39″27 (1899.98) 2*n*. 52 36

B and C

1898.73	38°1	1″01	3*n*	β
1898.80	35.3	0.97	1*n*	A
1899.94	34.0	1.19	3*n*	Doo

A and BC

1893.11	93°2	55″62	2*n*	Gla
1898.72	93.5	55.28	2*n*	β
1898.80	94.1	55.88	1*n*	A
1903.75	93.5	55.57	3*n*	β

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...Glasenapp (**II**)...A (3584)... Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

1980. **Σ 478.** No motion. 53 11

1865.58	136°2	9″72	3*n*	Δ
1893.00	135.8	9.24	2*n*	Gla
1904.85	136.4	9.33	3*n*	Cogshall

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^6...Glasenapp (**II**)...]

53^m 19^s **1981.** **A. G 76.** Noted as an 8″ pair in *A. G. Albany*, but not found double at the Kirkwood Observatory in 1903 (*A. J.* 554). This star is DM (2°) 635.

53 20 **1982.** **Σ 472.** Probably fixed.

1867.73	13°8	6″82	3*n*	Δ
1904.85	14.3	5.92	2*n*	Cogshall

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**IV**) . . . Δ (**II**) . . .]

53 36 **1983.** **Σ 476.** Change from proper motion.

1864.92	284°7	19″15	5*n*	Δ
1880.40	285.3	19.90	2*n*	β
1897.48	285.1	20.69	5*n*	Doo

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H^1 . . . Da^2 . . . Flm . . . Δ (1572) . . . Δ (**II**) . . . β^3 . . . Cin^6 HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Espin (*Mon. Not.* **LXII**, 528) . . . A (3465) . . .]

53 42 **1984.** **Hn 10.** The only later measures are:

1888.83	88°6	4″12	3*n*	Com

[β^4 . . . Com (**VI**) . . .]

53 50 **1985.** **Σ 479.** (= **S 442.**) Fixed. H N. 93 is probably identical with this (see No. 2012). The principal star has a proper motion of 0″042 in 201°3 (*A. G. Berlin*).

A and B

1866.50	127°8	7″25	3*n*	Δ
1883.95	127.3	7.35	2*n*	Per
1904.83	129.3	6.48	3*n*	Miller
1904.92	128.0	7.08	2*n*	β

A and C

1866.50	241°3	58″13	3*n*	Δ
1904.83	242.2	57.43	3*n*	Miller
1904.92	241.2	57.83	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . Bp . . . Ba (**I, II, III**) . . . Se . . . Wr . . . Ra (**XXI**) . . . Gl . . . Du . . . Δ (1185) . . . Δ (**I, II**) . . . Nobile (*Acc. Sci. Nap.* Jan. 1875) . . . Sp (**II**) . . . Per . . . Per (2684) . . . Giacomelli (**I**) . . Glasenapp (**II**) . . . β^6 . . .]

53 53 **1986.** **Σ 477.** Fixed.

1868.36	213°6	3″04	4*n*	Δ
1904.84	213.4	2.83	2*n*	Miller

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Se . . . Δ (**II**) . . . Glasenapp (**IV**) . . .]

54 6 **1988.** **H 5459.** The only measure of this is:

1900.12	259°2	13″25	1*n*	Hu	9.0 . . . 11.5

[Hu (*Bul. L. O.* No. 44) . . .]

54 52 **1990.** **Σ 481.** There is a decided change in the distance of C.

A and B

1867.26	106°2	2″37	3*n*	Δ
1891.89	103.4	2.48	3*n*	β
1904.84	106.4	2.10	2*n*	Cogshall

A and C

1867.12	327°9	17″85	3*n*	Δ
1891.89	327.1	17.23	3*n*	β
1904.84	325.2	14.99	2*n*	Cogshall

[Ma (*F. S.* **I**, 21, 97) . . . Ma (**XI, XIII, XV**) . . . Δ (1735) . . . Δ (**II**) . . . β (3114) (*Pub. L. O.* **II**) . . .]

(See p. 1063)

1993. **Σ 480.** Unchanged. "Duplex" in Arg. 54^m 57^s

1866.88	326°2	3″28	3*n*	Δ
1904.84	324.4	3.12	2*n*	Miller

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . Glasenapp (**II**) . . .]

1994. **A. G. 77.** Double in *A. G. Berlin*. Measures by Miller (*A. J.* 546). 54 57

1996. **Ho 221.** The principal star has a proper motion of 0″031 in 180° (*A. G. Harvard*). 55 10

[Ho (2977, 3558) . . .]

(See p. 1063)

1997. **Σ 487.** Both stars apparently unchanged. 55 12

A and B

1868.15	10°2	11″80	3*n*	Δ
1879.95	8.8	12.32	2*n*	β
1904.86	8.8	11.14	3*n*	Miller

A and C

1868.15	235°1	21″56	3*n*	Δ
1879.95	235.5	21.56	2*n*	β
1904.86	234.0	21.03	3*n*	Miller

[Ma (*F. S.* **I**, pp. 21, 45, 98) . . . Ma (**XI, XV**) . . . H (**VIII**) . . . Δ (**II**) . . . Cin^6 . . . β^3]

1998. **OΣ 70.** **B. A. C. 1244.** Without change. 55 14

1866.84	226°7	12″09	3*n*	Δ
1898.66	227.6	11.95	4*n*	Hu

[OΣ (**IX**) . . . Hd . . . Δ (**I**) . . . β^3 . . . Hu (*Pub. L. O.* **V**) . . .]

2000. **Espin 122.** Discovered by Espin (*Mon. Not.* LXII, 404; LXIII, 172). 55 18

(See p. 1063)

2004. **Σ 482.** Fixed. 55 49

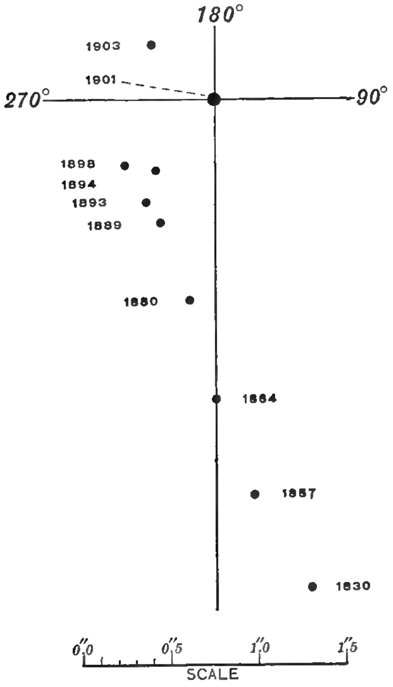
1866.16	124°3	13″38	3*n*	Δ
1904.84	121.8	13.34	2*n*	Cogshall

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . Cin^6 . . .]

2005. **Hd 64.** Probably the same as Hd 65. 56 :

2007. **Σ 483.** Until recently this appeared to be a clear case of rectilinear motion, but the most recent observations 56 2 indicate that the companion is moving in a very elongated ellipse. The angular motion should be rapid for the next few years.

1830.52	11°6	2″80	3*n*	Σ
1857.21	6.0	2.23	1*n*	Ma
1864.65	0.4	1.67	4*n*	Δ
1880.05	353.1	1.13	1*n*	β
1889.97	336.1	0.75	2*n*	HΣ
1893.80	326.5	0.70	1*n*	W
1894.67	320.8	0.52	2*n*	HΣ
1898.96	306.7	0.63	2*n*	Lewis
1901.76	262±	....	1*n*	β
1903.13	229.8	0.46	1*n*	Bowyer



Σ 483.

[Ma (*F. S.* I).. Ma (**XIII, XV**)... H2... Flm... Sk3... Δ (1572)... Δ (**II**)... Cin6. ...β3... HΣ (**XII**)... Wilson ( )... Lewis (*Mon. Not.* **LIX**, 400; **LXIV**, 791) ...β6...]

(See p. 1063)

$56^m 12^s$ **2008.** **Espin 55.** Discovered by Espin (3784) (*Mon. Not.* LXII, 531).

56 19 **2009.** **Σ 488** *rej.* From H (V). In DM 8.8 m. The only measures are:

1904.86	27°3	19″78	2*n*	Cogshall	9.0...11.2

56 31 **2010.** **Σ 489.** Fixed.

1867.15	196°1	2″93	3*n*	Δ
1892.96	197.7	3.05	2*n*	Gla

[Ma (*F. S.* I) ... Ma (**XI, XV**) ... Se ... Hd ... Δ (**II**) ... Cin4... Cin5... LM ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III**...]

2011. **Σ 474.** Probably unchanged. $56^m 55^s$

1867.07	146°4	22″92	3*n*	Δ
1904.92	146.0	23.32	2*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)... β6...]

2012. **H N. 93.** "Place extremely precarious." The place given is that of DM (22°) 626 (= Lalande 7481), but that star is not double, and has no near companion. It has a proper motion: 57 ±

Porter	0″157 in 136°6
A. G. Berlin	0.210 in 132.1

There is no doubt that H N. 93 is identical with Σ 479. (No. 1985.)

[β5...]

2013. 36 *Tauri.* **β 544.** Discovered with the 18½-inch. The proper motion of this star is small, 0″012 in the direction of 214°5 (Auwers). 57 11

1892.04	256°6	26″10	3*n*	β
1897.84	256.7	25.17	3*n*	β
1899.82	257.3	25.48	4*n*	Doo

[β (**X**)... β1... β (3114)... β (*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

2014–15. **Σ 485 and Σ 484.** There has been no change in the relative places of these stars. Struve's angle of B and A^1 is given in *Mens. Microm.* 244°0, but should be 64°0. Espin measures other small stars in the field. 57 18

AB	1867.32	303°1	17″89	3*n*	Δ	
BA^1	1867.32	64.2	48.99	3*n*	Δ	
A^1B^1	1867.32	130.8	5.38	3*n*	Δ	
A^1C^1	1867.35	334.3	22.58	3*n*	Δ	
BE	1867.68	333.6	19.86	2*n*	Δ	...11.0

[H1... Ma (*F. S.* **I**)... Ma (**XI**)... *Gr. Obsns.* 1840... Ra (**XXIII**)... Δ (1204)... Δ (**I, II**)... Bl (**V**)... Du... Glasenapp. (**II**)... Espin (*Mon. Not.* **LXII**, 402...]

2016. **β 1004.** Discovered with the 12-inch on Mt. Hamilton in 1881. There appears to be some change in the angle of AB. The change in C indicates a proper motion of 0″27 in the direction of 81°7 57 27

A and B

1895.08	144°8	1″54	3*n*	Sellors
1897.72	144.2	1.77	1*n*	See
1898.84	143.4	1.97	2*n*	A
1900.80	138.2	1.76	3*n*	Doo

A and C

1898.84	134°6	60″04	2*n*	A

[β (**XIII**)... β3... Sellors (3369)... See (3495)... A (3584)... Do (3798)... Doolittle (*A. J.* 547)... Scott (*Mon. Not.* **LXIV**, 52)...]

2017. **H 3615.** Measures only at the Kirkwood Observatory: 57 34

1904.86	157°2	25″44	2*n*	Miller	9...10

2019. **β 1277.** Discovered with the 40-inch. No other measures. 58 15

[β (*Pub. Y. O.* **I**)...]

$58^m\ 22^s$ **2020.** **H 3617.** The only measures are:

1904.86	64°.0	16″.62	2*n*	Miller	9...12

59 4 **2021.** **Hn 72.** From *Pub. Washburn Obsy.* II.

[Com (VI)...] (See p. 1063)

59 16 **2022.** **OΣ 71.** **(AC = H 671.)** H did not see B, and OΣ has no measure of C. The only measure of this star is:

1878.91	119°.0	34″.68	1*n*	β

There has been no change in the close pair.

1870.78	203°.7	1″.11	6*n*	Δ
1898.73	205.2	0.95	4*n*	Hu

[Ma (**XIII**)....OΣ (**IX**)....Se....Δ (**I**)....β3....Sk3....En (2742)....Hu (*Pub. L. O.* **V**)...]

59 17 **2024.** **Σ 491.** Unchanged.

1866.25	108°.8	2″.78	3*n*	Δ
1893.07	110.9	2.70	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... Δ (**II**) .. Jones (*Proc. Haverford Coll. Obsy.*, 1892)...Glasenapp (**II**)...]

59 20 **2025.** **β 1005.** Discovered with the 12-inch at Mt. Hamilton in 1881. No motion.

1891.89	61°.7	2″.47	3*n*	β
1898.74	62.1	2.77	3*n*	Hu
1898.84	60.8	2.56	2*n*	β

[β (**XIII**)...β3...β (3114) (*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...Doolittle (*Pub. Flower Obsy.* **I**)...]

59 24 **2026.** **β 545.** Discovered with the 18½-inch. There seems to be no material change. This star is in the field with OΣ 531. The measures given below connect the two pairs.

1890.79	310°.1	1″.09	4*n*	β
1891.78	309.3	1.05	3*n*	β
1898.82	303.6	1.04	2*n*	β

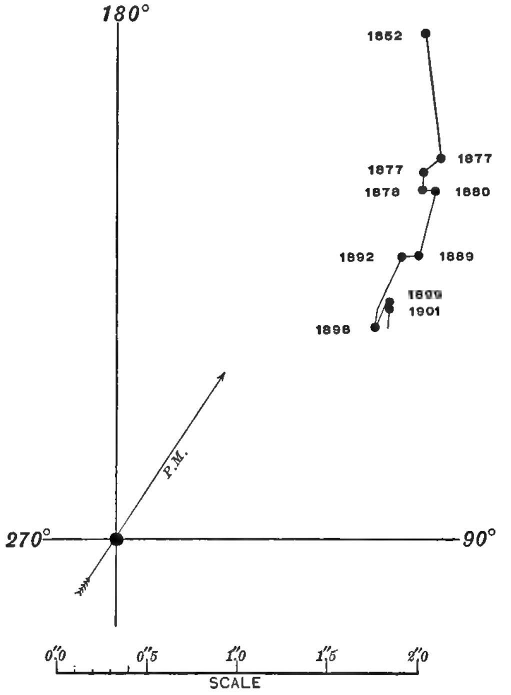
β 545 and OΣ 531

1851.16	25°.4	239″.76	2*n*	OΣ
1854.04	25.6	239.65	3*n*	OΣ
1858.20	25.8	239.03	2*n*	OΣ
1879.60	27.2	237.32	30*n*	Ball
1890.78	28.1	235.51	2*n*	β
1898.82	28.8	234.95	2*n*	β

[β (**X**)...β1...β (3048, 3114) (*Pub. L. O.* **II**)...OΣ (**X**, p. 61)...]

59 34 **2027.** **OΣ 531.** **P III. 242.** An interesting physical system, but the motion is very slow. The principal star has a proper motion of 0″.260 in the direction of 146°.5 (Porter). 50 *Persei*, 12′ distant, has the same movement in space. Ball has attempted to measure the parallax of OΣ 531, using for comparison the principal star of β 545. It will be seen from the diagram that the motion of the companion is practically rectilinear, and this may be a pair of the 61 *Cygni* class. Some of the principal measures of OΣ 531 are:

1852.69	148°.5	3″.32	7*n*	OΣ
1877.05	139.3	2.80	9*n*	Δ
1877.71	139.8	2.68	4*n*	OΣ
1878.66	138.5	2.60	2*n*	β
1880.02	137.3	2.64	3*n*	Hl
1889.10	132.9	2.32	3*n*	Hl
1891.78	134.3	2.25	3*n*	β
1893.05	134.2	2.24	3*n*	HΣ
1898.41	128.9	1.88	9*n*	Gr. Obsy.
1899.12	130.6	2.02	2*n*	A
1901.73	129.7	1.99	4*n*	Gr. Obsy.



OΣ 531

[OΣ (**IX**) (**X**, pp. 61, 198)....OΣ (*Mon. Not.* **XX**, 8).... Bl (**V**).... Bl (*Mon. Not.* **XLI**, 36)... Hl (**I, II**)... Sk3... Δ (**I**)... En (2678)... T (2899)... β (3114)... β (*Pub. L. O.* **II**)....Jones (*Proc. Haverford Coll. Obsy.*, 1892)....Brown (3645)...A (3639)...Hu (*Pub. L. O.* **V**)... HΣ (**XII**)... Maw (**IV**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...]

2028. **S 443.** Error of South in magnitude of C. Examined and identified; all small stars. B and C are DM (13°) 643 and 650. The only measures since South are: $59^m\ 49^s$

AB	1904.84	110°.2	42″.25	2*n*	Miller	9.0...9.9
AC	1904.84	305.1	184.63	2*n*	Miller	...8.0

2030. **H 2220.** The only measures are: 59 49

1900.75	296°.5	25″.80	2*n*	β5	8.0...11.5

$0^m\ 6^s$ **2031.** **Σ 492** *rej.* This is a bright star, with a minute double companion. Measures from β^5.

$0\ 14$ **2033.** **Σ 490.** Unchanged.

1866.56	56°4	4″59	3*n*	Δ
1904.90	57.4	4.50	2*n*	β

[Ma (*F. S.* **I**) ... Δ (**II**) ... β^6 ...]

$0\ 22$ **2034.** **Σ 493.** Unless Σ's angle is too large, there seems to be a little change.

1866.42	95°1	1″77	3*n*	Δ
1880.05	92.0	1.46	2*n*	β
1888.95	93.4	1.67	2*n*	Lv
1893.07	92.7	1.63	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... β^3 ... Cin^6 ... Lv^1 ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ...]

$0\ 42$ **2039.** **Σ 486.** No evidence of motion.

1867.75	341°2	9″07	3*n*	Δ
1896.35	340.5	9.13	2*n*	A

[Ma (*F. S.* **I**) ... H (**V**) ... Ma (**XI**) ... Δ (**II**) ... A (3395) ...]

$0\ 54$ **2040.** **Σ 495.** *Tauri* **179.** The general agreement of all the later measures would seem to indicate that the components are fixed, and that Σ's angle is too small.

1830.43	216°1	3″64	3*n*	Σ
1857.11	222.8	3.82	1*n*	Se
1865.92	222.4	3.84	3*n*	Δ
1872.95	220.5	3.95	1*n*	OΣ
1884.08	220.7	3.96	2*n*	Per
1887.87	219.5	3.71	2*n*	T
1892.89	221.4	3.70	2*n*	Jones

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Da^2 ... Wr ... OΣ (**IX**) ... Δ (1118, 1185) ... Δ (**I, II**) ... Per ... Per (2684) ... Jones (*Proc. Haverford Coll. Obsy.* 1892) ... Glasenapp (**II**) ... *A. G. Leipzig*, p. 206 ... HΣ (**XII**) ...]

$1\ 3$ **2041.** **Σ 3114.** To the principal star is assigned a proper motion of 0″174 in the direction of 200°2. Both stars must have the same movement, and the relative change is probably due to orbital motion.

1832.38	190°1	1″92	5*n*	Σ
1866.32	178.2	2.33	5*n*	Δ
1883.68	173.8	2.31	5*n*	En
1904.82	173.7	2.51	2*n*	β

[Δ (1573) .... Δ (**II**) .... Flm .... Sk .... Big .... En (2663) .... Sk^4 .... Doolittle (*Pub. Flower Obsy.* **I**) ... β^6 ...]

$1\ 7$ **2043.** **OΣ 72** **B. A. C. 1272.** In 1873 Δ suspected an elongation of the principal star in 173°8, and a similar appearance in 1874, but in 1875 it appeared single. Hussey examined this star in 1900 with the 36-inch and found it single with 1500. There is evidently an error of 100° in printing in Ma (XIII) 228°1 (1846.0). No material change.

1869.25	325°3	4″41	5*n*	Δ
1880.53	328.7	4.38	2*n*	β
1898.73	326.1	4.59	4*n*	Hu
1903.04	328.3	4.37	2*n*	Do

[Ma (**XIII**) .... Δ (**I**) .... Pl .... Sk^3 .... β^3 .... Doolittle (*Pub. Flower Obsy.* **I**) .... Hu (*Pub. L. O.* **V**) ... Do (3930) ...]

2044. **β 309.** Discovered with the 6-inch. No sensible motion. $1^m\ 22^s$

1876.03	278°7	5″94	2*n*	Hl
1890.00	276.8	5.94	3*n*	Hl
1899.09	277.1	5.59	1*n*	β

[β (**VI**) ... β (2062) (*Pub. Y. O.* **I**) ... Δ (**I**) ... Hl (**I, II**) ...]

2045. **β 1232.** Discovered with the 36-inch. Probably unchanged. $1\ 26$

1896.08	354°6	0″22 ±	5*n*	Sp
1898.72	351.8	0.40	2*n*	Hu
1903.04	344.8	0.50	1*n*	Lewis

[β (**XVIII**) ... β (3113) (*Pub. L. O.* **II**) ... Sp (**III**) ... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXIV**, 792) ... Hu (*Bul. L. O.* No. 44) ...]

2046. **Hd 66.** Identified and measured: $1\ 32$

1901.78	263°4	17″74	2*n*	β^5	9.6...9.6

The 40-inch shows a 15m star nearer A:

1901.79	263°4	5″68	1*n*	β^5

2049. **H 2223.** The only measures are: $1\ 43$

1904.68	199°1	18″45	2*n*	β^6	9.6...9.8

2050. **Ho 326.** Discovered by Ho with the 18½-inch. Slow direct motion in angle. $1\ 44$

1891.98	169°2	0″32	3*n*	β
1898.76	175.4	0.40	2*n*	Hu
1903.83	183.1	0.31	1*n*	A

[Ho (*A. J.* 215) (3233) .... β (3114) (*Pub. L. O.* **II**) .... Hu (*Bul. L. O.* No. 44) .... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 496; **LXII**, 383; **LXIV**, 792) ... A ( ) ...]

(See p. 1063)

2051. **Σ 494.** (= **H** N. 17 = **S 444.**) It is very doubtful if any change has taken place. Modern observers agree in making the angle a little less than Struve. $1\ 45$

1867.28	186°8	5″06	4*n*	Δ
1876.10	186.1	5.28	3*n*	Hl
1883.95	186.9	5.25	2*n*	Per
1889.33	187.1	5.21	3*n*	HΣ
1892.80	187.2	5.27	2*n*	Jones
1902.89	186.3	5.36	2*n*	Do

[H^1 ... Ma (*F. S.* **I**) ... Ma (**XI**) ... Bp ... Da^3 ... Da^4 ... Se ... Wr ... Du ... Ba (**II, III**) .. Δ (1118) ... Δ (**I, II**) ... Flm ... WS^2 ... Per ... Per (2684) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Giacomelli (**I**) ... Hl (**I, II**) ... Hayn (3051) ... Jones (*Proc Haverford Coll. Obsy.* 1891, 1892) ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Thiele (3837) ... Do (2984, 3680, 3930) ...]

2052. **Ho 327.** The only other measures are: $2\ 3$

1904.76	317°4	15″68	2*n*	β

The 40-inch shows a 13.5m star, 167°0: 14″2.

[Ho (3233) ... β^6 ...]

(See p. 1063)

$2^m\ 3^s$ **2053.** Σ 497. H 672 has exactly this place, 305°±: 14″±: 9...10. That is certainly identical with Σ 497, but error in H's angle. Some change, but probably only an optical pair.

1865.90	233°5	13″49	5*n*	Δ
1878.98	232.3	13.33	2*n*	β
1904.68	230.3	13.06	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... Δ (1572) ... Δ (**II**) ... Flm ... Gl ... β1 ... β3 ... β6 ...]

2 13 **2054.** **Howe 9.** Discovered by Howe at Cincinnati.

1884.87	169°1	1″21	1*n*	Wilson	8.5...8.7

[Cin6 ... Wilson (Cin10) ...]

2 27 **2055.** A. G. 78. Double in *A. G. Lund.* Measures by β6

2 37 **2057.** Σ 501. Fixed.

1867.76	296°3	29″15	3*n*	Δ
1904.68	296.6	29.00	2*n*	β

[Ma (*F. S.* **II**) ... En ... Δ (**II**) ... β6 ...]

2 41 **2058.** Σ 499. Since Part I of this catalogue was in type, I have examined and identified this as the 9.3m star, DM (23°) 630. The place of this is:

R. A. = $4^h\ 2^m\ 54^s$ }
Decl. = 23° 48′ }

The only complete measure of AB in the last fifty years is the following:

A and B

1904.60	288°1	1″61	2*n*	β

A and C

1904.60	280°1	31″24	2*n*	β

The star whose proper motion is given by Furner and Storey is not Σ 499, but a 7½ m star some distance *sp.*

[Ma (*F. S* **I**) ... Ma (**XI, XIII**) ... Δ (1736) ... β1 ... Glasenapp (**II**) ... Furner and Storey (*Mon. Not.* **LXIV**, 444) ... β6 ...]

3 12 **2059.** β 546. Discovered with the 18½-inch. There may be some advance in the angle.

1883.66	26°8	0″77	6*n*	En
1896.07	32.4	0.82	2*n*	Sp
1898.79	31.5	0.85	5*n*	Hu

[β (**X**) ... β1 ... β (*Pub. Y. O.* **I**) ... En (2678) ... Sp (**III**) ... Hu (*Bul. L. O.* No. 44) ... Lewis and Bowyer (*Mon. Not.* **LXIV**, 792) ...]

3 22 **2060.** Σ 498. Change doubtful. Distances uncertain.

1858.01	174°9	0″45	1*n*	Se
1868.10	170.2	1.10	2*n*	Δ
1878.84	171.6	1.81	1*n*	β
1897.09	164.1	1.47	3*n*	A
1897.89	167.8	1.62	4*n*	Doo

[Ma (*F. S.* **I**) ... H (**V**) ... Δ (**II**) ... Se ... β3 ... A (3465) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

2061. Σ 500. Unchanged. $3^m\ 26^s$

1868.59	79°9	3″86	4*n*	Δ
1904.82	78.6	3.87	2*n*	β

[Ma (*F. S.* **I**) .. H (**VI**) ... Se ... Δ (**II**) ... β6 ...]

2067. **Hu 212.** Discovered at Mt. Hamilton. 5 2

[Hu (*A. J.* 494) ... Espin (*Mon. Not.* **LXII**, 531) ...]

2068. OΣ 74. Very few early observations of this pair. It was noted as single by Secchi in 1859, and by Dembowski in 1865, but this is probably explained by the difficulty of the object with moderate apertures. The measures do not indicate any certain change. The observation in Sk4 probably belongs to 47 *Tauri* which is in the same vicinity. The principal measures are: 5 44

1845.50	283°7	0″3±	2*n*	Ma
1849.16	270.1	0.53	1*n*	OΣ
1894.13	294.4	0.5±	2*n*	HΣ
1897.35	293.3	0.36	5*n*	A
1898.50	293.1	0.36	6*n*	Hu
1901.94	288.4	0.36	1*n*	Bryant

[OΣ (**IX**) ... Ma (**XIII**) ... Se ... Δ (**I**, p. 227) ... Sk3 ... Sk4 ... HΣ (**XII**) ... Hu (*A. J.* 427) (*Pub. L. O.* **V**) ... A (3395) (*A. J.* 429) ... Bryant (*Mon. Not.* **LXII**, 383) ...]

(See p. 1063)

2069. **Upton 1.** Discovered by Winslow Upton at Cincinnati. This star is probably SD (18°) 769. 5 50

[Cin3 ... Cin4 ... Cin ...

(See p. 1063)

2070. Σ 510. Without change. 5 95

1867.61	299°6	10″99	4*n*	Δ
1904.74	302.1	11.02	2*n*	β

[Ma (*F. S.* **I**) .. Ma (**XI**) ... H (**VII**) ... WS2 ... Δ (**II**) ... β3 ... β6 ...]

2071. Σ 503. Without change. Not in DM, but near and *sp* DM (63°) 490. 6 4:

1867.15	225°7	4″46	3*n*	Δ
1902.90	224.3	4.40	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... β6 ...]

2073. *μ Persei.* **OΣ** 73. (AC = **H** VI. 20 = σ 114 = **Sh** 364.) Δ could not see the small star in 1865 and 1868. No evidence of change. 6 5

A and B

1878.50	348°7	14″78	2*n*	β
1897.47	348.8	14.70	3*n*	Doo
1898.21	349.6	15.07	3*n*	Hu
1901.72	349.1	14.38	2*n*	β

There is a 12.8m star nearer than C, 124°2: 50″36 (1901.72) 1*n*. The following are all the recent measures of C:

A and C

1897.70	231°7	85″02	5*n*	Doo
1901.72	231.7	84.16	2*n*	β

[H (**V**) ... OΣ (**IX**) ... Δ (**I**, p. 227) ... β1 ... β3 ... Doolittle (*Pub. Flower Obsy.* **I**) ... Hu (*Pub. L. O.* **V**) ... β5 ...]

6m 6s **2076.** **β** 1233. Discovered with the 12-inch. At first the principal star was suspected to be a close pair, but this was not verified with the large telescope. In DM 7.4 m; *A. G. Christiania* 6.8 m. The later measures show no change. The large star has a proper motion of 0″104 in 180° (Schroeter).

1898.73	38°4	5″10	2*n*	β
1899.85	38.7	5.22	2*n*	Doo

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

6 26 **2078.** **Σ** 504. No material change.

1866.53	264°2	6″77	3*n*	Δ
1904.90	264.7	7.00	2*n*	β

[Ma (*F. S.* **I**)...H (**IV, VI**)...Gl...WS^{2}...Δ (**II**)...β^{6}...]

6 41 **2079.** **Σ** 505. Very little, if any, motion.

1866.88	116°2	8″93	3*n*	Δ
1896.71	115.7	9.17	3*n*	A
1897.62	117.9	9.44	5*n*	Doo
1904.94	118.0	9.14	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1735)...Δ (**II**)...Flm...A (3395)...Doolittle (*Pub. Flower Obsy.* **I**)...β^{6}...]

6 49 **2080.** **Σ** 514. Unchanged.

1867.67	76°3	7″73	4*n*	Δ
1904.77	74.8	7.86	2*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...Ma (**XI**)...Δ (**II**)...β^{3}...β^{6}...]

7 0 **2081.** **β** 1278. Discovered with the 40-inch in looking for 47 *Tauri*. The DM magnitude is 6.8. No other measures.

[β (*Pub. Y. O.* **I**)...]

7 8 **2082.** **Σ** 515. Unchanged.

1866.90	45°3	3″45	3*n*	Δ
1904.77	42.7	3.32	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Se...Cin^{6}...Glasenapp (**II**)...β^{6}...]

7 10 **2083.** **Σ** 512. Unchanged.

1867.06	226°1	5″28	3*n*	Δ
1892.95	224.5	5.05	2*n*	Gla

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...Cin^{6}...Glasenapp (**II**)...]

7 25 **2084.** 47 *Tauri*. **β** 547. Discovered with the 18½-inch. A fine pair, but the change, if any, is very slow. The proper motion of this star is small, 0″050 in the direction of 227°5 (Auwers), but it is sufficient to show that it is common to both stars, as otherwise there would be a decided change in both angle and distance.

The distant companion appears to be fixed in space. With the position of C from the measures of 1898, and the proper motion of A given above, the minimum distance between A and C of 1″6 will occur in about 630 years.

A and B

1877.90	359°7	0″82	3*n*	Δ
1878.93	359.8	0.89	3*n*	β
1886.20	363.4	1.18	2*n*	HΣ
1888.81	359.7	0.91	3*n*	β
1889.93	358.6	0.75	3*n*	Sp
1889.02	359.5	0.94	3*n*	T
1896.70	353.4	0.91	3*n*	A
1898.80	361.4	1.07	2*n*	β

AB and C

1898.82	224°5	31″56	3*n*	β

[β (**X**)...β^{1}...β^{3}...β (2875) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... HΣ (**XII**)... Δ (**I**)...Lv^{1}...T (2991)...Sp (**III**)...A (3395)...]

2086. **Σ** 509. Fixed. C is DM (61°) 691. 7m 35s

A and B

1866.84	20°3	11″97	3*n*	Δ
1904.82	19.7	11.97	2*n*	β

A and C

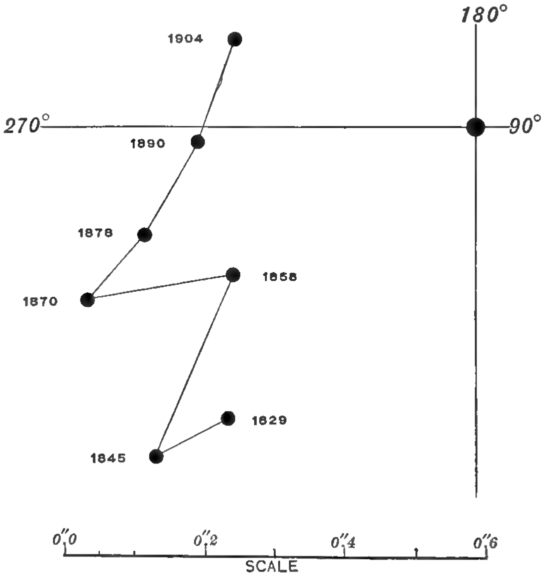
1866.84	248°0	38″02	3*n*	Δ
1904.82	247.6	37.72	2*n*	β

[Ma (*F. S.* **I**, 21, 45)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...β^{6}...]

2087. **H** 2225. The North Polar Distance in H is printed 100° too large. Identified, as given here, and measured: 7 47

1903.72	231°4	30″06	2*n*	β^{6}	8.5...10.6

2088. **Σ** 511. Binary. Distance decreasing, with retrograde motion in angle. 7 51



Σ 511

1829.52	320°0	0″54	4*n*	Σ
1845.14	316.2	0.65	3*n*	OΣ
1858.02	302.0	0.40	2*n*	Se
1870.25	294.3	0.60	1*n*	OΣ
1878.84	288.4	0.49	1*n*	β
1890.94	273.3	0.39	3*n*	Hl
1904.83	250.2	0.36	2*n*	β

[Ma (*F. S.* I) ... Ma (**X**) ... OΣ (**IX**) (**X**, p. 152) ... Hl (**I, II**) ... Hl (*Wash. Obsns.* 1880) ... Big ... Δ (1473) ... Δ (**II**) ... En (1673, 2663) ... T (2898) ... β^3 ... Se ... Se (*Comp. Rend.* **XLVIII**, 375) ... Flm ... WS^2 ... Sk ... Sk^3 ... Sk^4 ... β^6 ...]
(See p. 1063)

7^m 58^s **2089.** Σ 508. Without change.

1866.59	261°.1	2″.66	3*n*	Δ
1904.83	258.0	2.64	3*n*	β

[Ma (**XIII**) ... Δ (**II**) ... Ma (*F. S.* I) ... β^6 ...]

8 9 **2090.** **Howe 10.** Discovered by Howe at Cincinnati. "Double" in Cordoba Zones.

1902.01	39°.7	2″.32	3*n*	Do

[Cin^3 ... Cin^4 ... Wilson (Cin^{10}) ... Do (3798, 3799) ...]

8 13 **2091.** **Kr 22.** Noted as double in *A. G. Hels.*

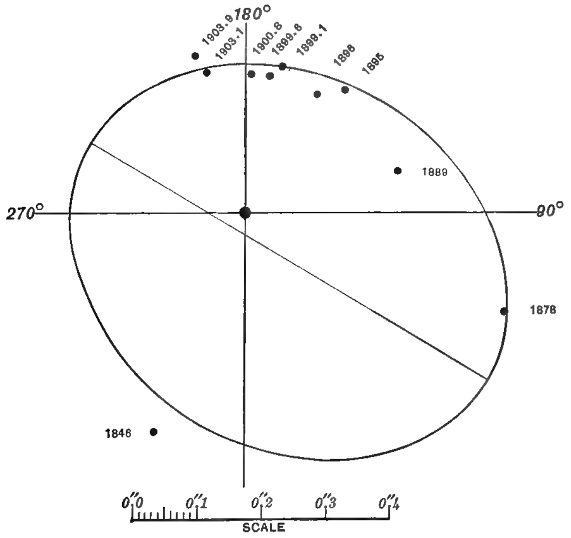
[β (3042) (*Pub. L. O.* **II**) ...]

8 15 **2092.** OΣ 75. No material change.

1843.33	165°.5	0″.37	2*n*	Ma
1869.70	165.9	0.47	1*n*	Δ
1878.84	164.2	0.48	1*n*	β
1898.33	167.4	0.64	4*n*	Hu
1904.90	166.6	0.63	2*n*	β

[Ma (**XI**) ... OΣ (**IX**) ... Δ (I) ... β^3 ... Hu (*Pub. L. O.* **V**) ... β^6 ...]

8 19 **2093.** OΣ 77. (AC = **OΣ (App)** 43.) The close pair must be in rapid motion, but there are few measures, and as the components are of the same magnitude, there is some difficulty in the adjustment of the quadrants. All of the position-angles are subject to a correction of 180°. I have given on the accompanying diagram what appears now to be the most probable arrangement of the measures. The ellipse shown is merely a suggestion of the possible form of the apparent orbit, but it is evident that the measures of another half century will be necessary before any reliable results can be reached. The period is not likely to be less than eighty years.



OΣ 77

The following are the principal measures:

1846.06	338°.2	0″.37	2*n*	OΣ
1846.12	330.1	0.35	1*n*	Ma
1852.19	337.3	0.3 ±	1*n*	Ma
1859.05	250 ±	....	1*n*	Se
1878.50	69.3	0.44	4*n*	β
1889.81	105.2	0.25 ±	1*n*	HΣ
1895.16	141.1	0.25 ±	1*n*	HΣ
1896.90	148.6	0.22	3*n*	A
1899.10	166.1	0.24	3*n*	Lewis
1899.63	170.1	0.22	3*n*	Hu
1900.77	178.1	0.22	3*n*	A
1903.08	195.4	0.23	2*n*	Bowyer
1903.87	198.1	0.26	2*n*	A

In 1878 I suspected a faint and close companion to C, but as this could not be seen by the Mt. Hamilton observers, it has probably no existence.

The most distant star is not in OΣ. No change in C.

1875.13	41°.8	56″.12	2*n*	Δ
1899.26	41.9	56.42	4*n*	Hu

[Ma (**XIII**) ... OΣ (**IX, X**) ... Δ (I, pp. 227, 243) ... Se ... β^1 ... En (2678) ... Engelhardt (2785) .... Franz (3080) .... Engelhardt (**II**) ... Renz (*Bul. St. P. Acad.* 1892) ... Lewis (*Mon. Not.* **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ... A (3465) (*Bul. L. O.* No. 11) ...]
(See p. 1063)

2094. Σ 506. Unchanged. 8^m 20^s

1867.44	292°.8	9″.62	3*n*	Δ
1904.43	293.1	9.81	2*n*	β

[Ma (*F. S.* I) ... H (**IV, V**) ... Δ (**II**) ... Gl ... WS^2 ... β^6 ...]

2095. OΣ 76. Glimpsed only by Δ in 1865.9; single 1852 Ma. These observations refer rather to the difficulty of seeing the faint star than to any probable change in position. No motion since OΣ. 8 23

1889.90	209°.1	3″.82	2*n*	HΣ
1899.08	212.0	3.98	3*n*	Hu

[Ma (**XIII**) ... OΣ (**IX**) ... Δ (I, p. 227) ... A (3465) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ...]

2097. OΣ 78. Unchanged. Erroneously entered as a Washington discovery by Hl (II). 8 30

1868.48	247°.0	2″.71	4*n*	Δ
1898.19	245.4	2.54	3*n*	Hu

[Ma (**XIII**) ... OΣ (**IX**) ... Δ (I) ... Flm ... Hl (**I, II**) ... Pt ... Sk^2 .... Big ... Big (*Bul. Ast.* **XII**, 299) ... Hu (*Pub. L. O.* **V**) ...]

2099. See 34. Discovered at the Lowell Observatory. 8 36

1899.25	53°.5	19″.00	3*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...] (See p. 1063)

8m 39s **2100.** β 86. Discovered with the 6-inch. Without change. There is a 13 m star, 260°4 : 26″6.

1898.74	49°7	4″32	3*n*	Hu
1898.84	51.0	4.19	1*n*	β

[β (II) . . . β (*Mon. Not.* **XXXIII**, 437) (*Pub. Y. O.* **I**) . . . Δ (I) . . . Hussey (*Bul. L. O.* No. 44) . . . Kustner (3821) . . .]

8 40 **2101.** β 1333. (AB = Σ 513.) Since Part I of this catalogue was printed, I have measured this pair. On the night of the second measure, which was unusually favorable, the smaller component was strongly suspected to be a very close pair. I requested Aitken to verify this if possible at Mt. Hamilton, which he has done, and sent the following measure:

B and C

1904.90	93°1	0″23	2*n*	A	10.0 . . . 11.2

It is a very difficult object with any aperture. There is no change in the Struve pair:

1866.45	57°8	5″54	3*n*	Δ
1904.83	57.4	5.30	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (I) . . . β6 . . .]

8 41 **2102.** 39 *Eridani.* Σ 516. (= H N. 24.) Apparently fixed. The stars have a common proper motion of 0″164 in 193°0 (Auwers).

1868.20	150°9	6″45	4*n*	Δ
1888.14	150.1	6.44	3*n*	Hl

[Ma (*F. S.* **I**) . . . Ma (**XI, XII**) . . . J1 . . . J2 . . . J3 . . . WJ2 . . . H (**V, VIII**) . . . H3 . . . Wr . . . Se . . . Hd . . . WS . . . Gl . . . OΣ (**IX**) . . . Pk . . . Lv1 . . . Hl (**II**) . . . Cin5 . . . Cin6 . . . Δ (1109, 1256) . . . Δ (I, II) . . . T (2991) . . . (*Proc. Haverford Coll. Obsy.* 1891) . . . Scott (*Brit. Ast. Ass'n* **VI**, 368) . . .]

8 42 **2103.** OΣ (App) 44. Unchanged.

1901.06	321°8	58″49	1*n*	Es

[Δ (I) . . . Franz (3080) . . . Espin (*Mon. Not.* **LXIV**, 678) . . .]

9 7 **2106.** H VI. 98. (= OΣ (App) 45.) These stars have a large common proper motion:

Porter	0″169	in	221°4
Bossert	0.175	in	210.8

There is no relative change.

1875.33	314°8	65″47	3*n*	Δ	6.2 . . . 6.7
1894.02	315.1	65.31	2*n*	Eng	
1897.70	315.0	65.54	6*n*	Doo	

[Δ (I) . . . Engelhardt (**III**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

9 25 **2107.** H 673. The principal star is greatly overrated in H, or error in printing. The only later measures are:

1901.81	195°6	21″19	2*n*	β5	9.2 . . . 9.6

9 51 **2108.** Σ 517. Without change.

1868.02	14°4	3″32	4*n*	Δ
1904.68	12.4	3.33	1*n*	β

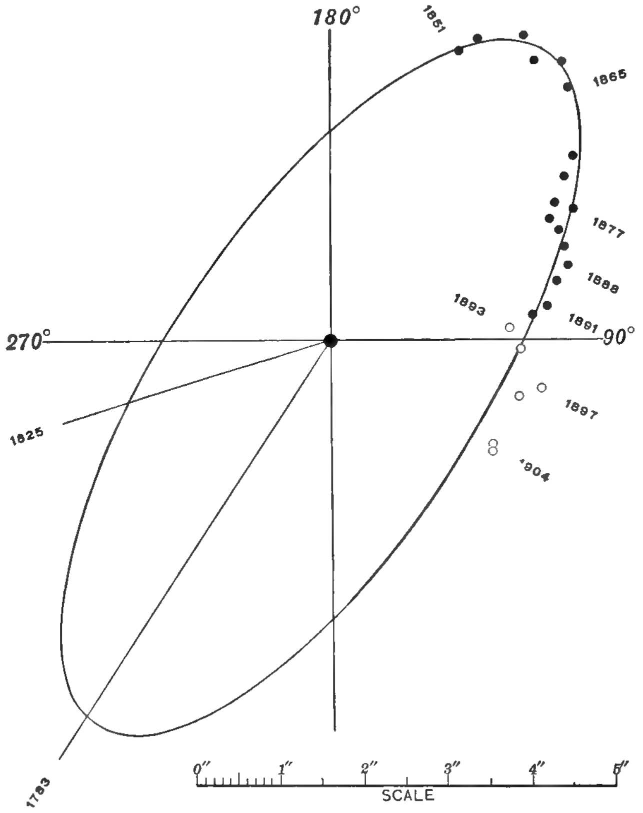
[Ma (*F. S.* **I**) . . . Ma (**XII**) . . . H (**V, VII**) . . . Se . . . Δ (**II**) . . . Hd . . . WS2 . . . Gl . . . β6 . . .]

2109. 40 *Eridani.* Σ 518. (= H II. 80. AB = Σ 1, App. II = S 446.) The double companion to 40 *Eridani* was discovered by Herschel in 1783. It was next observed by Struve in 1825, but was too difficult to measure. The measures of precision really commence with the observations of O. Struve in 1851. 9m 52s

Though the period is long, this is an interesting binary from the large proper motion of the system. Only four stars in the northern hemisphere have a larger proper motion. This is common to the principal star, and to the binary companion which is more than 80″ distant.

Stumpe	4″049	in	211°9
Porter	4.108	in	212.6
Kustner	4.082	in	212.9

From the collected measures of BC down to 1891 I have investigated the orbit of this pair (*Mon. Not.* LIII, 478) and found a period of 179.7 years. My original diagram is reproduced here, with the later measures, 1893 to 1904, added thereto. These subsequent positions are as well represented as could be expected in a pair of this class with the varied distances given by the several observers. The general form and extent of the apparent orbit in the fourth quadrant depends entirely upon Herschel's position-angle of 1783. Any substantial error in this will change more or less the elements of the orbit. It is unfortunate that for nearly seventy



40 Eridani. Σ 518

years no observation was made which is of any value in such an investigation. As I have shown in the paper above referred to, the estimated angle of Struve is only the general direction of the large star with reference to BC. It is obvious that there can be no certain advance made in predicting the path of the companion star until it has reached about the maximum distance, and about the position-angle of the first observation in 1783, and that will probably not be before the middle of this century.

Since the publication of the orbit shown, three other orbits have been found, but all based upon substantially the same apparent ellipse. The several results are:

1883	Gore	139.0 yrs.	*Mon. Not.* XLVI, 291
1891	Burnham	179.7	*Mon. Not.* LIII, 478
1891	Glasenapp	176.2	*A. N.* 3357
1891	Stichtenoth	167.0	*A. N.* 3366
1903	Doolittle	180.0	*Proc. Am. Philos. Soc.* XLII

The list of printed measures given in the paper referred to was complete to 1891. This list, with the principal recent measures added which are shown on the diagram, is as follows:

B and C

1	1783.13	326°7	Cl. II	1*n*	♅
2	1825.12	287	....	1*n*	Σ
3	1851.06	159.9	3″ ±	1*n*	Da
	1851.22	155.8	3.91	4*n*	OΣ
4	1855.06	154.0	4.14	6*n*	OΣ
5	1864.85	147.6	4.45	2*n*	Wn
6	1865.90	144.0	4.26	2*n*	OΣ
7	1669.10	140.4	4.46	1*n*	OΣ
8	1873.85	137.0	4.27	4*n*	OΣ
9	1877.84	128.2	3.92	6*n*	*β*
	1877.84	127.5	3.36	3*n*	Cin
	1877.95	126.4	3.94	4*n*	*Δ*
10	1879.05	125.4	3.49	4*n*	*β*
	1879.11	122.9	....	1*n*	Cin
	1879.18	125.0	3.51	2*n*	Hl
11	1879.47	124.7	4.04	3*n*	OΣ
	1879.75	120.0	3.29	1*n*	Cin
	1880.09	121.3	3.28	5*n*	*β*
	1880.95	122.0	3.16	5*n*	*β*
12	1881.84	119.0	3.53	6*n*	*β*
	1882.12	118.1	3.24	2*n*	Hl
13	1883.00	119.2	3.07	2*n*	*β*
14	1883.80	115.8	3.10	2*n*	Hl
15	1886.00	112.2	3.22	2*n*	Lv
	1886.09	112.2	3.00	6*n*	Hl
	1886.92	111.0	3.01	3*n*	T
16	1888.12	107.7	3.04	5*n*	Hl
17	1888.84	106.8	2.94	3*n*	*β*
	1888.87	105.0	2.81	3*n*	T
	1889.12	103.5	2.79	4*n*	Hl
18	1890.73	100.0	2.68	4*n*	*β*
	1891.05	98.5	2.65	5*n*	Hl
19	1891.78	97.4	2.48	4*n*	*β*
20	1893.21	93.8	2.18	1*n*	Com
21	1895.91	87.4	2.32	1*n*	Collins
22	1897.97	77.2	2.62	3*n*	A
23	1899.11	73.6	2.39	2*n*	A
24	1903.87	56.8	2.31	2*n*	A
25	1904.70	55.2	2.38	3*n*	*β*

There is no sensible change in the position of B with reference to the large star. Some of the measures are:

A and B

1783.13	107°5	81″78	1*n*	♅
1825.05	107.5	85.32	2*n*	Σ
1851.22	106.2	82.24	4*n*	OΣ
1863.11	105.4	82.83	3*n*	En
1865.05	105.9	82.14	9*n*	*Δ*
1877.12	105.7	81.55	2*n*	OΣ
1886.12	105.9	81.98	3*n*	Hl
1891.04	105.5	82.09	4*n*	Hl
1899.11	105.4	82.52	2*n*	A
1904.70	105.3	82.12	3*n*	*β*

There are other small stars near, which are not connected with this binary system. Measures of other stars in the field, where the change is due to the large proper motion of A, are:

A and *a*

1850.98	197°0	128″29	1*n*	OΣ
1864.84	185.0	75.85	1*n*	Wn
1865.87	184.8	71.80	1*n*	OΣ
1877.80	145.6	37.10	3*n*	*β*
1878.95	137.3	35.99	2*n*	*β*
1882.12	118.0	35.34	2*n*	Hl
1886.12	94.0	40.46	3*n*	Hl
1888.10	84.7	44.94	3*n*	Hl
1904.95	53.1	103.07	1*n*	*β*

A and *b*

1850.98	278°7	99″40	1*n*	OΣ
1865.87	314.6	92.07	1*n*	OΣ

[Σ (331)...*Mens. Micr.* p. cxi ... *Pos. Med.* p. ccx... H (**V**)...Da³...Se¹...Se³ ... En ... Kn...*Δ* (1475)...*Δ* (**II**, p. 588)...Wn (1738)... OΣ (**IX**) (**X**, pp. 62, 153)...Flm...Pk...Sk...Sk³... Engelhardt (*Obsns. Ast.*, Part 2)... Cin⁴... Cin⁵...Cin⁶...Wilson (Cin¹⁰)...LM...Hl (**I, II**)...Hl (*Sid. Mess.* I, 94)... Hl (*Wash. Obsns.* 1882, 1883, 1886)...Hl (2682)...Gill (*Mem. R. A. S.* **XLVIII**, Part I) parallax...T (2898, 2991)...Gore (*Liverpool Ast. Soc.* **V**, 140)...Gore (*Mon. Not.* **XLVI**, 291) orbit...*β*¹...*β*²...*β*³...*β* (2875, 3048, 3114)...*β* (*Pub. L. O.* **II**)...*β* (*Mon Not.* **XXXIV**, 371)(*Mon. Not.* **LIII**, 478) orbit...Ho(3234)... Everett (*Mon. Not.* **LVI**, 464)... Collins (*A. J.* 378)...Com (*Pub. Washburn Obsy.* **X**)...Glasenapp (3357)...Stichtenoth (3366)...Do (3378)...Scott (*Mon. Not.* **LIX**, 427) ... Solá (3563, 3679) ... A (3638) (*A. J.* 429) ... Do (3798)... Doolittle (*Pub. Am. Philos. Soc.* **XLII**)..*β*⁶...]

2110. **Ho 328.** No other measures. 10^m 2^s

[Ho (3233) (*A. J.* 215)...] (See p. 1063)

2111. **H 3632.** A small error in Decl. of H. Both stars in Cordoba G. C. 10 20

1851.0	164°5	10″64		WJ	7	...10.5
1904.04	162.9	11.04	1*n*	*β*	7.5	... 8.5

[WJ...WJ²...Do (3378, 3799)...*β*⁶...]

2114. ***β* 548.** Discovered with the 18½-inch. No material change. 10 58

1891.86	345°4	6″10	2*n*	*β*
1898.83	345.2	6.14	3*n*	Cg

[*β* (**X**)...*β*¹...Cin⁵...*β* (3114) (*Pub. L. O.* **II**)...Cogshall (*A. J.* 478)...]

11^{m} 6^{s} **2115.** **Σ** 520. Probably binary, but the rapid change shown by Σ's measures is not supported by the later observations.

1832.20	104°0	0″82	3*n*	Σ
1837.10	98.7	0.96	2*n*	Σ
1841.96	99.4	0.96	2*n*	OΣ
1854.13	102.9	0.97	1*n*	Da
1869.64	106.7	0.89	5*n*	Δ
1883.99	109.3	0.81	3*n*	Per
1889.16	111.5	0.82	3*n*	Hl
1891.85	110.7	0.92	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**IX**) ... OΣ (**IX**) ... Da³ ... Se ... Se (*Comp. Rend.* **XLVIII**, 375) ... Wn (1738) ... Bp ... Ba (**II**) ... Δ (1204) ... Δ (**I, II**) ... Pl ... Wn (**V**) ... Sk² ... Per ... Per (2684) ... Hl (**II**) ... Big ... En (2742) ... β (3114) ... β (*Pub. L. O.* **II**) ... Glasenapp (**II**) ...]

11 25 **2116.** **OΣ (App)** 46. The larger star has a proper motion of 0″09 in 180° (*A. G. Harvard*). Espin measures a 12 m star nearer A, 188°6 : 34″40 (1901.07) 1*n*.

1883.36	159°7	99″06	4*n*	Franz
1901.07	160.2	98.88	1*n*	Es

[Δ (I) ... Franz (2649) ... Espin (*Mon. Not.* **LXIV**, 678) ...]

11 52 **2118.** **Σ** 519 *rej.* The only measures are:

1892.96	346°8	18″50	2*n*	Espin	7.5...9.0
1900.75	346.1	18.13	2*n*	β	7.7...9.3

[Espin (*Brit. Ast. Ass'n* **III**, 229) ... β⁵ ...]

11 52 **2119.** A. G. 79. Double in *A. G. Lund.* Measures by β⁶.

11 56 **2120.** **β** 1234. Discovered with the 36-inch. The only later measure is:

1898.80	203°3	2″05	4*n*	Hu

[β (**XVIII**) ... β (3113) (*Pub. L. O.* **II**) ... Hu (*Bul. L. O.* No. 44) ...]

11 56 **2121.** **S** 445. (= σ 117 = **OΣ (App)** 47.) A small diminution in the distance of B, which is DM (49°) 1161.

1841.17	327°0	75″47	1*n*	OΣ	
1875.13	327.3	74.62	2*n*	Δ	6.5...7.2
1879.41	327.1	74.44	3*n*	Doubiago	

[OΣ (X) ... Δ (II) ... Doubiago (*Poulkowa Obsns.* **X**) ... Franz (3080) ...]

12 34 **2125.** **Σ** 525 *rej.* In Σ Cl. V and II. Measures from Cin⁶. The only other measures are:

AB	1902.82	244°0	43″54	2*n*	β⁶	8.0...
BC	1902.82	169.5	7.81	2*n*	β⁶	8.8...9.3

12 34 **2126.** **Σ** 523. Fixed. A distant star in Glasenapp.

1869.04	163°2	10″36	4*n*	Δ
1893.03	161.8	10.34	2*n*	Gla

Ma (*F. S.* **I**) ... H² ... Ma (**XI**) ... Wr ... Δ (**II**) ... Glasenapp (**II**) ...]

12 41 **2128.** **OΣ (App)** 49. B is L 8093. The later measures show no motion.

1901.75	144°7	102″79	2*n*	β

[Δ (I) ... β⁵ ...]

2129. **Σ** 521. Without change. 12^{m} 44^{s}

1870.22	255°7	2″05	4*n*	Δ
1904.85	256.3	2.26	2*n*	β

[Ma (*F. S.* I) ... Ma (**XIII**) ... Δ (**II**) ... Bl (**V**) ... WS² ... β⁶ ...]

2130. *ϕ Tauri.* **Sh** 40. (= **H** V. 13 = σ 118 = **OΣ (App)** 48.) Slow change from proper motion. The movement of A is given: 12 58

Auwers	0″071 in 201°0
Rechenberg	0.090 in 216.2

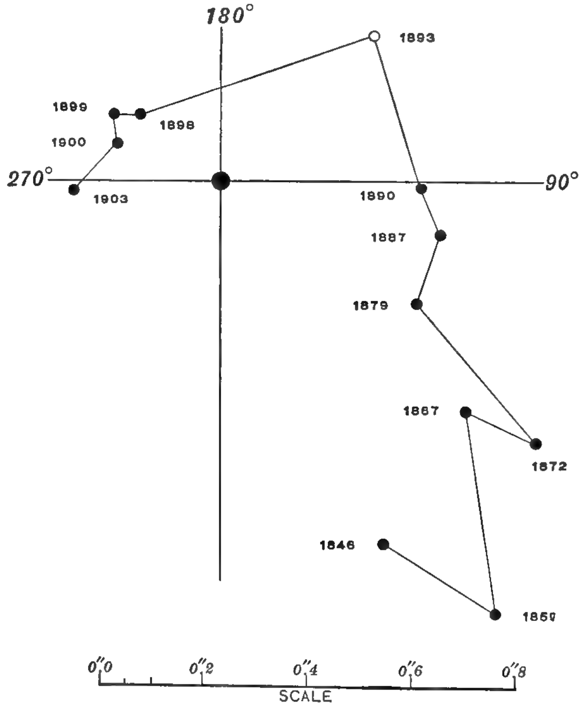
The latter authority gives the proper motion of B, 0″058 in 229°2.

1856.60	244°4	54″41	3*n*	OΣ	5.1...8.5
1875.14	245.5	53.57	2*n*	Δ	5.0...8.0
1886.09	246.4	52.90	4*n*	Eng	
1890.95	246.5	53.18	2*n*	Hl	
1892.01	246.7	52.73	4*n*	Franz	
1904.67	247.8	52.33	3*n*	β	

[Ra (**XXIII**) ... Pt ... Δ (I) .. Hl (**II**) ... OΣ (**X**) ... Engelhardt (2785) ... Engelhardt (**II**) ... Franz (3464) ... β⁶ ...]

2134. 55 *Tauri.* **OΣ** 79. Binary of long period. The system has a proper motion of: 13 3

Auwers	0″107 in 106°4
Weersma	0.095 in 103.4



55 Tauri. OΣ 79

In the last few years the angular motion of the companion has been rapid. Hussey, from the measures to 1900, finds that a period of 200 years will satisfy the observed positions. It will be seen from the measures and the diagram that there is nothing in the material at hand to limit or define the unexpired part of the apparent orbit, which might be nearly circular, or very elongated. The following are the principal measures:

1846.06	24°3	0″76	2*n*	OΣ
1859.05	32.5	0.98	2*n*	Se
1867.25	46.9	0.64	4*n*	Δ
1872.22	50.3	0.78	3*n*	Δ
1879.00	58.2	0.44	1*n*	β
1887.59	76.4	0.43	6*n*	Sp
1890.67	87.9	0.38	4*n*	β
1893.06	133.7	0.4±	2*n*	HΣ
1898.84	230.1	0.20	2*n*	Hu
1899.63	237.7	0.24	3*n*	Hu
1900.77	249.6	0.21	3*n*	A
1903.93	272.9	0.28	3*n*	A
1904.09	279.6	0.42	2*n*	Biesbroeck

[Ma(**XI, XIII**)...Se...OΣ (**IX**)...En (1674)...Flm...Do (2322)...Sk²...Sp (**II**) Sp (**II**, App)...Δ (I)...β³...Sp (**III**)...β (3048) (*Pub. L. O.* **II**)...T (3186)... Big (*Bul. Ast.* **XII**, 299)...HΣ (**XII**)... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 496) ...Hu (*Pub. L. O.* **V**)...A (*Bul. L. O.* No. 11)...Biesbroeck...]

(See p. 1063)

13^m 13^s **2135.** Σ 527. Apparently fixed, but later observers make the distance larger.

1868.25	192°1	5″97	4*n*	Δ
1880.09	191.9	6.14	2*n*	β
1888.10	193.7	5.95	2*n*	T
1904.68	194.0	6.05	3*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)....Cin⁵...Cin⁶...β³...T (2991)...β⁶...]

13 18 **2136.** Σ 522. Probably unchanged.

1866.83	216°2	1″57	3*n*	Δ
1893.12	212.6	1.50	2*n*	Gla

[Ma (*F. S.* I)...H (**V**)...Se...Δ (**II**)...Glasenapp (**II**)...]

14 6 **2139.** Σ 524. Unchanged

1868.78	56°9	6″65	4*n*	Δ
1903.74	56.0	6.76	2*n*	β

[Ma (*F. S.* I)...Δ (**II**)...β⁶...]

14 21 **2140.** β 310. Discovered with the 6-inch. Fixed.

1891.89	171°7	19″11	3*n*	β	7.7...11.2

[β (**VI**)...β (2062, 3114) (*Pub. L. O.* **II**)...Hl (**I, II**)...]

(See p. 1064)

14 49 **2143.** **Knott 1.** This is the supposed variable star, *U Tauri.* The only other measures are:

1891.79	203°8	3″12	3*n*	β	9.1... 9.2

[Kn...D'Arrest (1689)...Kn (*Observatory* **XIV**, 97)...β (3114) (*Pub. L. O.* **II**)...]

15 15 **2146.** OΣ 80. **B. A. C.** 1339. Perhaps a little change in the angle.

1869.73	184°0	0″58	6*n*	Δ
1883.74	181.9	0.47	5*n*	En
1884.98	181.6	0.74	2*n*	Per
1898.70	179.8	0.60	3*n*	Hu
1901.63	178.0	0.71	3*n*	Doo

[OΣ (**IX**)...Ma (**XI**)...Se...Fim...Δ (**I**)...Sk²...Per...Per (2749)...En (2678) ...Big (*Bul. Ast.* **XII**, 299)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 496; **LIX**, 486; **LXII**, 383; **LXIII**, 403)....Hu (*Pub. L. O.* **V**)....Doolittle (*A. J.* 547)...]

15^m 17^s **2147.** χ *Tauri.* Σ 528. (= **H IV.** 10 = **Sh** 41.) The principal star is given a proper motion of 0″036 in 140°5 (Battermann). There is no relative motion.

1866.10	25°1	19″16	3*n*	Δ
1889.97	24.3	19.28	2*n*	Giacomelli
1904.68	24.9	19.28	3*n*	β

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...Se...Se³...Ra (**XXIII**)...Ba (**II**)...Δ (1118)...Δ (**I, II**)...Giacomelli (I)...Glasenapp (**II, III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...β⁶...]

15 18 **2149.** β 87. Discovered with the 6-inch. A fine colored pair; Δ gives *golden : blue.* This is No. 74 of Birmingham's *Catalogue of Red Stars.* A naked-eye star in *Taurus* (B. A. C. 1342). The components are evidently fixed.

1886.15	171°0	2″10	2*n*	HΣ
1891.81	169.4	1.97	3*n*	β
1900.78	169.2	1.74	3*n*	Doo

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β (3114) (*Pub. L. O.* **II**)...Δ (I)...Δ (2081) ...T (2899)...OΣ (**X**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

15 19 **2150.** **Ho** 329. The principal star has a proper motion of 0″138 in 195°7 (Porter).

1898.08	65°1	35″13	3*n*	Doo
1899.11	66.5	34.64	1*n*	A
1903.83	64.8	35.03	2*n*	β

[Ho (3233)...Doolittle (*Pub. Flower Obsy.* **I**)...A (3638)...β⁶...]

(See p. 1064)

15 28 **2151.** Σ 529. No material change.

1869.49	17°2	4″17	4*n*	Δ
1904.69	16.4	4.14	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin⁶...β⁶...]

15 29 **2152.** Σ 526. Unchanged.

1866.75	53°4	5″69	3*n*	Δ
1904.94	54.0	5.59	2*n*	β

[Ma (*F. S.* I)...Δ (**II**)...β⁶...]

15 32 **2153.** **See** 36. The later measures are:

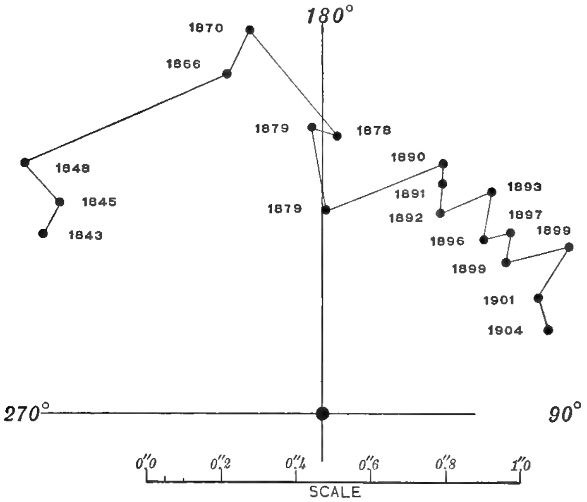
1899.83	347°0	7″69	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

15 56 **2154.** OΣ 82. A binary system in slow retrograde motion. It has a proper motion of 0″096 in 92°4 (Weersma). Three orbits have been found:

1892	Glasenapp	158.4 yrs.	*A. N.* 3193
1892	Gore	90.54	*Mon. Not.* LIV, 529
1900	Hussey	97.94	*Pub. L. O.* V

The measures are very discordant, especially in distance, even the best of them, as will be seen from the accompanying diagram, but if they were much better they could not give with any certainty the path of the ellipse in the first and fourth quadrants, and hence any result obtained at this time must be considered as at best roughly approximate. The motion so far would seem to indicate that the observations of another half century may be required to give the orbit with any exactness.



OΣ 82

In one measure of this by Madler, it is called OΣ 81.

1843.22	237°7	0″99	1*n*	Ma
1845.96	231.7	0.90	1*n*	Ma
1848.66	230.4	1.04	2*n*	OΣ
1866.73	195.9	0.94	3*n*	Δ
1870.94	191.0	1.04	2*n*	Δ
1878.13	177.1	0.74	1*n*	Δ
1879.16	182.2	0.76	2*n*	Hl
1879.69	179.4	0.54	1*n*	β
1890.12	153.8	0.74	7*n*	T
1891.01	151.5	0.79	3*n*	Hl
1891.02	151.4	0.72	3*n*	HΣ
1891.14	152.1	0.69	2*n*	Big
1892.00	149.3	0.62	2*n*	β
1893.89	141.6	0.75	5*n*	HΣ
1896.08	136.6	0.63	2*n*	Lewis
1896.11	136.3	0.61	5*n*	Sp
1897.97	126.9	0.88	3*n*	A
1897.96	133.3	0.70	4*n*	Hu
1899.12	129.1	0.64	3*n*	Hu
1899.52	123.6	0.80	2*n*	A
1901.57	117.7	0.66	3*n*	Doo
1904.18	110.2	0.65	3*n*	Biesbroeck

[Ma (**XIII**) . . . OΣ (**IX**) . . . Δ (**I**) . . . Do (2322) . . . Sk^3 . . . Hl (**I, II**) . . . Glasenapp (*Ast. and A.-P.* **XII**, 759) . . . Flm . . . T (3186) . . . β^2 . . . β (3114) (*Pub. L. O.* **II**) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 496) . . . . Gore (*Mon. Not.* **LIV**, 529) . . . Big (*Bul. Ast.* **XII**, 299) . . . Sp (**III**) . . . Glasenapp (3193) . . . Sk^4 . . . Everett (*Mon. Not.* **LVI**, 464) . . . HΣ (**XII**) . . . β (*Pop. Ast.* **IV**, 173) . . . Com (*Pub. Washburn Obsy.* **X**) . . . Hu (*A. J.* 427) (*Pub. L. O.* **V**) . . . A (3638) (*A. J.* 429) . . . Doolittle (*A. J.* 547) . . . Biesbroeck . . .]

(See p. 1064)

2156. **H 1143.** An observation in H (V) makes R. A. 52ˢ less; 64°3 : 10″ ± : 9–10 . . . 12. $16^m\ 13^s$

2157. **Σ 536.** The slow increase in angle shown by Struve's measures is verified by the later observations: 16 13

1867.29	154°4	1″70	3*n*	Δ
1880.02	160.2	1.83	3*n*	Hl
1888.13	162.3	1.56	3*n*	Hl
1898.08	163.1	1.74	3*n*	A

[Ma (*F. S.* **I**) . . . Ma (**XI, XII**) . . . Δ (**II**) . . . WS . . . Gl . . . Cin^4 . . . Cin^5 . . . Cin^6 . . . Pt . . . Flm . . . LM . . . Wilson (Cin^{10}) . . . T (2991) . . . *Haverford Coll. Obsy.* 1892 . . . A (3584) . . . Do (3798, 3799) . . .]

2158. **Σ 537.** The distance and angle increasing; evidently rectilinear motion. 16 21

1832.39	334°0	14″99	4*n*	Σ
1867.10	336.9	15.28	3*n*	Δ
1891.86	340.4	15.98	1*n*	β
1900.72	341.5	16.42	2*n*	β

[Ma (*F. S.* **I**) . . . H (**IV, V, VIII**) . . . Ma (**XIII**) . . . Hd . . . Δ (**II**) . . . β (3114) (*Pub L. O.* **II**) . . . β^5 . . .]

2159. *Eridani* 299. **β 744.** (ACD = **H 3644.**) The principal star of the wide triple, H 3644, was found with the 6-inch to be a close pair. The measures indicate some motion in angle. 16 32

The Cordoba magnitude of the large star (Lalande 8264) is 6¼, and of D (O. Arg. S. 3022) 7¾ m.

A and B

1894.10	301°4	0″59	1*n*	Sellors
1897.73	312.1	0.52	1*n*	See
1898.88	314.0	0.81	1*n*	A
1898.93	307.3	0.80	1*n*	Bd

A and C

1891.79	6°8	35″42	2*n*	β	. . . 11.7
1898.93	7.2	35.80	1*n*	Bd	. . . 11.0

A and D

1891.78	40°4	44″63	3*n*	β	. . . 8.3
1898.93	40.8	44.88	1*n*	Bd	. . . 9.0

[^{3} (**XI**) . . . β^2 . . . β (3114) (*Pub. L. O.* **I, II**) . . . Sellors (3303) . . . See (3495) . . . A (3584) Boothroyd (*A. J.* 478) . . .]

2160. **Σ 533.** (= **Ḫ IV. 72** = **S 447.**) Fixed. 16 37

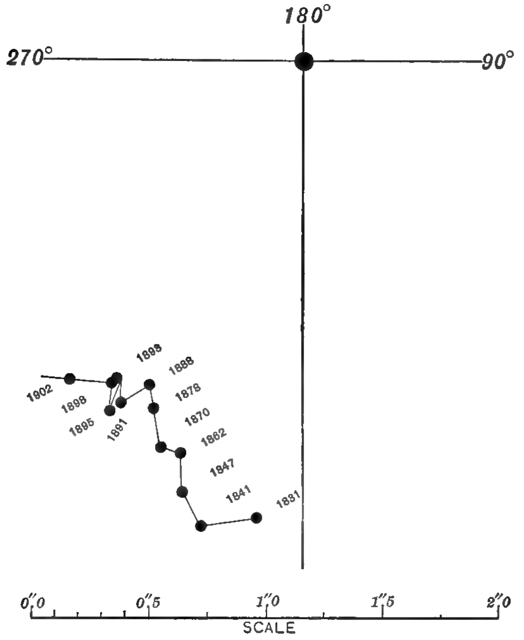
1868.66	61°3	19″56	4*n*	Δ
1889.01	60.1	19.73	5*n*	Giacomelli

[Ma (*F. S.* **I**) . . . H (**II**) . . . Se^1 . . . Ra (**XXVIII**) . . . Bl (**V**) . . . Δ (1118, 1185) . . . Δ (**I, II**) . . . T (2898) . . . Giacomelli (**I**) . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

2161. *Tauri* 230. **Σ 535.** In retrograde movement, and probably binary. 16 39

1831.34	353°9	1″95	5*n*	Σ
1841.96	347.4	2.02	2*n*	OΣ
1847.40	344.2	1.90	3*n*	Da
1862.99	342.4	1.74	5*n*	Δ
1870.01	339.6	1.74	2*n*	Δ

1878.76	336°.4	1″.60	1*n*	*Δ*
1888.14	334.5	1.52	3*n*	Hl
1891.42	331.9	1.65	3*n*	HΣ
1893.14	329.4	1.56	3*n*	Maw
1895.92	331.2	1.69	2*n*	Collins
1898.08	329.3	1.58	2*n*	A
1902.41	323.6	1.68	7*n*	Bowyer



Σ 535

[H2...Ma(*F. S.* I)...Ma (**XI, XIII**)...OΣ (**IX**)...Da3...Se...Se3...*Δ* (1109, 1473)...*Δ* (I, II)...Hl (I, II)...Bp...Ba (II, III)...Wr...Gl...WS...WS2...En (1673)....Sp (2132)....Sp (II)....Flm....Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Pl...Sk...Per...Bru2...Per (2684)...Lv1...T (2991)...Jones (*A. J.* 312) (*Proc. Haverford Coll. Obsy.* 1892...Hayn (3051)...Collins (*A. J.* 378)...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LVI**, 359; **LIX**, 400; **LX**, 496; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)....HΣ (**XII**)....Sk5....Glasenapp (**II**)...Maw (**II**)...Do (3680)...A (3584)...]

$16^m 45^s$ **2162.** 62 *Tauri.* **Σ 534.** (= **H IV. 109 = Sh 42.**) The proper motion of both stars is given in *A. G. Berlin:*

A = 0″.025 in 186°.2
B = 0.024 in 214.4

As there has been no relative change from the first, both stars must have the same movement

1866.15	289°.6	28″.87	4*n*	*Δ*
1884.02	289.9	29.00	3*n*	Per
1893.03	289.6	28.94	2*n*	Gla
1904.91	290.1	28.93	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Ra (**XXIII**)...Du...*Δ* (**II**)...Per...Per (2684)...T (2899)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...*β*6...]

16 51 **2163.** 56 *Persei.* **OΣ 81.** The measure in Ma (XI) evidently belongs to OΣ 82. Very little change, but the stars have a common proper motion of 0″.077 in 158°.2 (Auwers).

1869.39	50°.2	4″.36	6*n*	*Δ*
1891.99	41.6	4.71	2*n*	HΣ
1898.14	41.9	4.62	4*n*	Hu

[OΣ (**IX**)...Ma (**XIII**)...Ba (I)...*Δ* (I)...Sk3...Maw (**II**)...HΣ (**XII**)...Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...]

2164. **Ho 15.** (= **Ku 17.**) Without change. $16^m 55^s$

1899.12	146°.1	0″.84	2*n*	A
1901.09	149.2	0.77	2*n*	Ku

[Ho (2778, 3558)...A (3638)...Kustner (3821)...] (See p. 1064)

2167. **β 402.** Discovered with the 6-inch. No motion. There is a 14m star, 111°.1 : 29″.0. 17 3

1891.86	73°.0	7″.48	2*n*	*β*
1898.72	74.2	7.51	2*n*	*β*
1901.78	74.5	7.52	2*n*	*β*

[*β* (**VII**)...*β*1...*β* (2103, 3114) (*Pub. L. O.* **II**)...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Cogshall (*A. J.* 478)...*β*5...]

2168. **Σ 530.** "A star 13m precedes," H (V). Readily seen with the 6-inch; about 30″ distant. No change in AB. Recently observed to get the position of the Herschel star, which the 40-inch shows to be a moderately close pair: 17 5

		A and B			
1867.37	200°.2	13″.88	3*n*	*Δ*	
1901.73	200.1	14.12	3*n*	*β*	
		A and C			
1901.75	279°.9	36″.82	2*n*	*β*	
		C and D (new)			
1901.75	43°.8	1″.47	2*n*	*β*	11.8...12.0

[Ma (*F. S.* I)...*Δ* (**II**)...*β*5...]

2169. **Σ 531.** There may be a little change in the angle, but the motion is very slow. 17 5

1853.56	291°.4	0″.99	3*n*	OΣ
1869.05	298.3	1.10	5*n*	*Δ*
1877.26	296.8	0.99	1*n*	OΣ
1883.87	301.8	1.07	6*n*	En
1894.18	304.2	1.02	3*n*	Sk

[Ma (*F. S.* I)...Ma (**X**)...OΣ (**IX**) (**X**, p. 153)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...Bl (**V**)...*Δ* (**II**)...Sk...Sk3...En (2663)...Big (*Bul. Ast.* **XII**, 299)...Sk4...]

2170. **Ho 330.** Discovered at the Dearborn Observatory by Hough (3233). (See p. 1064) 17 16

2172. 66 *Tauri.* **Hu 304.** The only later measures are: 17 19

1903.93	28°.7	0″.32	2*n*	A

[Hu (*Bul. L. O.* No. 12)...A (   )...]

$17^{m}\ 19^{s}$ **2173.** **H 342.** (AB = ♅ IV. 117 = Σ 539 *rej.*) The only late measures are:

		A and B		
1877.95	234°5	17″33	1*n*	β
1901.72	235.0	17.52	2*n*	β
		A and C		
1877.95	84°3	28″73	1*n*	β
1901.72	82.1	28.22	2*n*	β

[H (IV)...β^{1}...β^{5}...]

17 20 **2174.** **β 1235.** Discovered with the 36-inch. Near κ *Tauri.* So far unchanged.

1896.09	54°5	0″25±	6*n*	Sp
1898.79	65.3	0.37	2*n*	Hu
1899.55	60.6	0.31	2*n*	Lewis

[β (XVIII)...β (3113) (*Pub. L. O.* II)...Sp (III)...Lewis and Bowyer (*Mon. Not.* LIX, 400; LX, 496; LXIV, 792)...Hu (*Bul. L. O.* No. 44)...]

17 31 **2175.** **Ho 331.** The only later measures are:

1904.77	349°7	15″81	2*n*	β

[Ho (3233)...β^{6}...]

(See p. 1064)

18 12 **2177.** κ^{1} *Tauri.* **Σ 9, App. I.** (= ♅ **VI. 8.**) B is κ^{2} *Tauri.* No relative change. The proper motions (*A. G. Berlin*) are:

A = 0″077 in 134°1
B = 0.130 in 113.1

1870.40	172°8	340″32	6*n*	Δ
1879.60	172.8	339.65	4*n*	Je

[Se^{3}...β^{2}...Δ (II)...Δ (1736)...Ra (XXVI)...Je (2329)...]

18 14 **2178.** **Σ 541** *rej.* A faint pair between κ^{1} and κ^{2} *Tauri.* Magnitudes in Σ, 9–10...9–10. The only measures since Δ are:

1900.75	329°9	5″47	3*n*	β	9.2...9.3

[Δ (1979)...Δ (II)...β^{6}...]

18 19 **2179.** **Hu 608.** Discovered at Mt. Hamilton (*Bul. L. O.* No. 57.)

18 25 **2181.** **Hu 609.** Discovered at Mt. Hamilton (*Bul. L. O.* No. 57.)

18 33 **2183.** δ *Tauri.* ♅ **VI. 101.** The proper motion of A is given:

Bossert	0″143	in	90°0
Weersma	0.094	in	104.1

The only measures are:

1879.00	232°6	76″76	2*n*	β	...9.2
1896.16	232.8	77.42	3*n*	A	...9.0
1904.77	233.3	76.90	3*n*	β	

The small star appears to be moving with the other.

[β^{3}...A (3395)...β^{6}...]

2185. **Σ 543.** Fixed. $18^{m}\ 40^{s}$

1868.30	191°5	4″91	4*n*	Δ
1904.77	192.5	4.81	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β^{6}...]

2187. **β 1185.** Discovered with the 36-inch. The magnitude in DM is 7.5. The later measures show rapid angular motion: 18 52

1896.09	18°0	0″2±	4*n*	Sp
1899.92	352.0	0.14	2*n*	A

[β (XVII)...β (3047)...β (*Pub. L. O.* II)...Sp (III)...A (3638)...]

(See p. 1064)

2188. **Σ 544.** The distance increasing, and motion rectilinear. 18 57

1831.72	356°7	2″14	3*n*	Σ
1867.53	353.8	2.33	3*n*	Δ
1878.93	352.3	2.32	1*n*	Cin
1884.83	353.9	2.51	1*n*	Wilson
1886.94	353.3	2.71	1*n*	LM
1888.04	352.5	2.86	1*n*	Lv
1903.82	352.8	2.57	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H (V)...H (VIII)...Se...WJ ^{2}...En (1673)...Cin^{4} Cin^{5}...LM...Lv^{1}...Wilson (Cin^{10})...Δ (II)...Do (3798)...β^{6}...]

2189. **Σ 542.** Unchanged. 19 0

1867.12	104°9	21″21	3*n*	Δ
1904.97	105.5	21.17	2*n*	β

[Ma (*F. S.* I)...Ma (XIII)...H (V)...WS...Gl...Δ (II)...β^{6}...]

2191. **H 677.** "Elegant." Marked "double" in *Harvard Zones.* The only measure is: 19 10

1900.68	110°8	5″10	1*n*	β^{6}	9.5...10.0

2192. **β 745.** Discovered with the 6-inch on Mt. Hamilton in 1879. 19 11

1898.87	129°3	0″65	1*n*	Hu
1899.20	136.0	0.70	1*n*	Lewis

[β (XI)....β^{2}....β (3114) (*Pub. L. O.* I, II)....Hu (*Bul. L. O.* No. 44)....Lewis (*Mon. Not.* LX, 496)...]

2193. **Σ 538.** Unchanged. The 40-inch shows a 14 m star, 357°5 : 11″3. 19 17

1868.35	218°8	7″39	4*n*	Δ
1904.88	218.5	7.29	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β^{6}...]

2194. **β 403.** Discovered with the 6-inch. Unchanged. 19 18

1888.08	101°4	2″08	2*n*	T	8.0...9.5
1888.39	98.3	1.95	3*n*	Lv	7.0...9.2
1893.10	104.2	1.79	2*n*	Gla	7.5...9.0
1898.85	98.6	1.96	3*n*	Cg	7.3...9.5

[β (VII)....β (2103)....Δ (I)....Lv^{1}....T (2991)....Glasenapp (II)....Cogshall (*A. J.* 478)....]

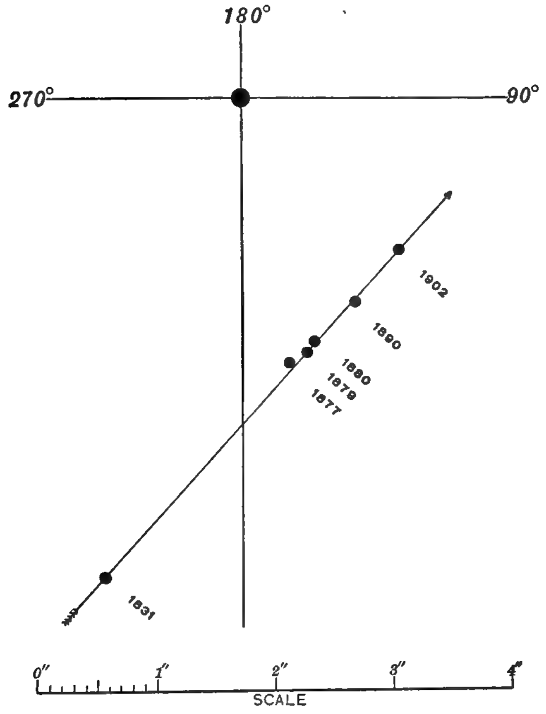
19^m 30^s **2196.** 71 *Tauri.* **Hd 67.** "Very close" Hd. I have examined this many times with the 18½-inch, and in 1890 with the 36-inch, but always found it single. There is very little probability of its being double. This star has a proper motion of 0″.098 in 98°.2 (Auwers).

[β (3048) (*Pub. L. O.* **II**) . . .]

19 36 **2197.** **H 2288.** The principal star (= Groombridge 828) has a proper motion of 0″.087 in 7°.6. The only later observation is:

1904.88	240°.5	39″.55	2*n*	β^6

19 48 **2198.** **Σ 547.** The change is due to the proper motion of the principal star. *Δ* could not see the companion in 1865.



Σ 547

A least square solution of the six sets of measures, 1831–1902, gives for the most probable movement of A, 0″.049 in 315°.0. The distance is now about minimum.

1831.39	344°.3	4″.25	3*n*	Σ
1877.99	9.8	2.31	3*n*	β
1879.05	14.0	2.26	4*n*	β
1880.60	16.1	2.19	5*n*	β
1890.82	28.5	2.01	3*n*	β
1902.37	45.4	1.86	6*n*	β

[Ma (*F. S.* **I**) . . . Wn (2186) . . . *Δ* (1736) . . . Flm . . . WS^2 . . . Cin^5 . . . Gl (*Observatory* **III**, 352) . . . β^1 . . . β^3 . . . β (2176, 3048) . . . β (*Observatory* **III**, 408; **XIV**, 56) . . . β (*Pub. L. O.* **II**) . . . Glasenapp (**II**) . . . Sk^4 . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . β^5 . . . β^6 . . .]

2199. **Σ 540.** Apparently unchanged. 19^m 53^s

1866.78	181°.1	3″.10	3*n*	*Δ*
1904.90	181.9	2.46	3*n*	Cogshall
1904.94	182.1	2.97	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . *Δ* (**II**) . . . β^6 . . .]

2200. **Σ 546.** (= **H II. 54.**) The principal star has a considerable proper motion: 20 0

Porter	0″.157 in 137°.5
Bossert	0.272 in 123.4
A. G. Berlin	0.156 in 143.8

There has been no change in the position of B.

1865.94	187°.0	6″.82	3*n*	*Δ*
1894.09	185.7	6.74	3*n*	Eng
1904.77	186.0	6.87	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . Bp . . . Ba (**II**) . . . Wr . . . Da^3 . . . Gl . . . WS . . . WS^2 . . . Do (2196) . . . Do (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . *Δ* (**II**) Engelhardt (**III**) . . . β^6 . . .]

2201. **Σ 545.** (= **H IV. 74.**) Fixed. The principal star is given a proper motion of 0″.021 in 241°.7 (Weersma). 20 8

1864.66	57°.5	18″.80	3*n*	*Δ*
1884.05	57.1	18.97	2*n*	Per

[Ma (*F. S.* **I**) . . . Ma (**XII, XIII, XV**) . . . Se . . . OΣ (**IX**) . . . *Δ* (**II**) . . . Per . . . Per (2684) . . .]

2205. **Kr 23.** Noted as double in *A. G. Hels.* 20 35

1900.07	132°.6	4″.80	2*n*	Espin

[β (3042) (*Pub. L. O.* **II**) . . . Espin (3717) . . .]

2207. *Tauri* 248. **β 1186.** Discovered with the 36-inch. A naked-eye star in *Taurus;* 6m in Argelander and Heis. Lalande 8372. The motion, if any, is slow. 20 51

1893.61	185°.3	0″.55 ±	2*n*	Sp
1896.09	180.5	0.64	5*n*	Sp
1898.03	174.4	0.75	3*n*	A

[β (**XVII**) . . . β (3047) (*Pub. L. O.* **II**) . . . Sp (**III**) . . . A (3584) . . .]

(See p. 1064)

2209. **Σ 549.** (= **H IV. 75** = **S 449.**) No change since Struve. 21 16

1867.19	157°.2	25″.63	3*n*	*Δ*
1903.80	156.7	25.46	3*n*	β

The 40-inch shows a nearer companion not heretofore seen:

1903.81	354°.3	16″.38	2*n*	β	. . . 13.5

[Ma (*F. S.* **I**) . . . Ma (**XIII**) . . . Ra (**XXVI**) . . . *Δ* (**II**) . . . β^6 . . .]

2210. **Σ 548.** (= **S 448.**) Fixed. A distant star in Glasenapp. 21 18

1868.66	35°.7	14″.49	4*n*	*Δ*
1893.02	35.5	14.35	2*n*	Gla
1904.90	35.6	14.58	3*n*	Miller

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Se^1 . . . Ra (**XXVIII**) . . . Bl (**V**) . . . *Δ* (1185) . . . *Δ* (**I, II**) . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III**) . . .]

21m 42s **2212.** θ^1 and θ^2 *Tauri.* **Σ 10, App. I.** These stars are relatively fixed, but have a common proper motion. This movement is given by Auwers from meridian positions:

$$\theta^1 = 0''.071 \text{ in } 102^\circ.2$$
$$\theta^2 = 0.092 \text{ in } 91.9$$

The measures in Se^1 are credited to Σ 11, App. I.

1864.70	346°.3	338″.04	6*n*	Δ
1879.16	346.4	337.38	6*n*	Je
1893.10	346.4	337.09	2*n*	Gla

[P^1 ... WJ ... Se^1 ... Se^3 ... Ra (**XXVI**) ... En ... Je (2329) ... Δ (**II**) ... Glasenapp (**II**) ...]

21 52 **2213.** *Eridani* 315. **β 311.** Discovered with the 6-inch. Change uncertain. The Cordoba magnitude is 6.2. Lacaille 1451.

1891.72	147°.5	0″.98	2*n*	Lv	7.3...7.4
1897.67	333.2	0.70	1*n*	See	6.0...6.6
1898.88	332.3	0.85	2*n*	Cg	7.5...7.5

[β (**VI**) ... β (2062) ... Cin^3 ... Cin^4 ... Wilson (Cin^{10}) ... Lv (*Proc. Haverford Coll. Obsy.* 1891) ... See (3495) ... Cogshall (*A. J.* 478) ...]

(See p. 1064)

22 4 **2215.** **H 2233.** The only measures are from the Kirkwood Observatory:

1904.93	310°.1	11″.15	2*n*	Cg	10.2...12

22 7 **2216.** **O. Stone 7.** Discovered at the Cincinnati Observatory. Identified and measured:

1902.88	184°.0	4″.96	2*n*	β	9.3...9.4

[Cin^3 ... β^6 ...]

22 31 **2219.** **Innes 413.** Discovered by Innes at the Cape of Good Hope (*Mon. Not.* LXIII, 77; LXIV, 131).

22 32 **2220.** 1 *Camelopardali.* **Σ 550.** (= **H N. 67 = Sh 43.**) Fixed. The large star has a proper motion of 0″.017 in 122°.3 (Auwers).

1866.42	307°.4	10″.22	3*n*	Δ
1893.15	306.3	10.26	2*n*	Gla
1901.58	306.7	10.24	2*n*	Espin

[Ma (*F. S.* **I**) ... Da^1 ... Ba (**I**) ... Lu (**I, II, III**) ... Lu (1103) ... Peters (1042) ... Auwers (1393) ... Wr ... *Greenwich Obsns.* 1840 ... H (**V**) ... K (409) ... Bes ... Ek (**I**) ... Ra (**XXI**) ... Se ... Δ (1013) ... Δ (*Mem. Accad. Sci.*) ... Δ (**I, II**) ... Du .... WS^2 .... Bl (V) .... Franz (2590) .... Glasenapp (**II**) .... Cohn (3240) .... *Annals Toulouse Obsy.* **III** ... Espin (*Mon. Not.* **LXIV**, 676) ...]

22 33 **2221.** **H 1145.** "MS. indistinct; ? if P = 115°.1." Looked up, and measured; not in DM.

1903.66	126°.4	4″.71	2*n*	β^6	10.6...10.8

22 45 **2222.** **β 184.** Discovered with the 6-inch. No sensible change. In Gould 6.9m.

1889.01	261°.4	1″.12	3*n*	Lv
1899.09	257.8	1.19	1*n*	β
1903.14	259.9	1.25	2*n*	Scott

[β (**IV**) .... β (*Mon. Not.* **XXXIV**, 282) .... Cin^4 .... Lv^1 .... Lv (*Proc. Haverford Coll. Obsy.* 1891) ... Do (3378, 3798) ... See (3495) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

22m 54s **2224.** **Σ 551.** Apparently without motion.

1866.84	126°.4	13″.67	3*n*	Δ
1904.90	127.3	13.56	3*n*	Cogshall

[Ma (*F. S.* **I**) ... Δ (**II**) ...]

22 56 **2225.** **OΣ 83.** It is uncertain whether this star is really double or not. No signs of duplicity have been detected in recent years. OΣ found it single on 2*n* in 1844; but on 3*n* in 1846–47 an elongation was suspected in 145°, 211°, and 269°. In 1843.2 Ma measured a supposed elongation of 0″.2 in 236°.8. Se found it single in 1859, Ma in 1852, and Δ in 1865. It appeared to me perfectly round with the 18½-inch in 1879. I did not examine it with the 36-inch at Mt. Hamilton, but in 1899 Hussey found it perfectly round with that instrument. The probabilities are that this star is not double.

[Ma (**XI, XIII**) ... Se ... OΣ (**IX**) ... Δ (**I**, p. 227) ... β^3 ... Hu (*Pub. L. O.* **V**) ...]

23 2 **2226.** **β 549.** Discovered with the 18½-inch. Probably no motion.

1891.86	190°.5	8″.66	2*n*	β	7.8...11.0
1898.71	189.2	8.44	1*n*	β	8.3...10.8
1898.91	186.8	8.52	3*n*	Cg	7.2...12.0

[β (**X**) ... β^1 ... β (3114) ... β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... Cin^5 ... Cogshall (*A. J.* 478) ...]

23 12 **2229.** **Σ 552.** (= **H N. 44 = S 450.**) No change.

1867.81	114°.3	9″.09	4*n*	Δ
1891.07	114.1	8.75	4*n*	Gla

[H^1 ... H^2 ... Ma (*F. S.* **I**) ... Ma (**X, XI**) ... Da^2 ... Ra (**XXIII**) ... Wr ... Se ... Bl (**V**) ... Δ (1204) ... Δ (**I, II**) ... Seagrave (*Sid. Mess.* **II**, 274) ... T (2898) ... Glasenapp (**II, III**) ...]

23 17 **2230.** 80 *Tauri.* **Σ 554.** A remarkable binary, about which very little is known. For nearly forty years after its discovery by Struve there was no certain change in either angle or distance so far as the measures were concerned, and it is uncertain at this time whether the motion with reference to the large star is direct or retrograde. The only recent measure, my own of 1897, which was made under not the best conditions, is difficult to reconcile with the later failures to see this star double with large apertures. It was noted at the time, "the smaller seems to be *f*," which would imply nearly equal components. While this page is going through the press, I learn from Hu that he has found the 6.5 m star, DM (15°) 633, which is 70s *p* and 31′.8 *n* of 80 *Tauri*, to be a close pair. His measures are:

1904.81	263°.1	0″.44	3*n*	Hu	6.6...6.7

It will be seen that my measure, with a correction of 180° in the angle, agrees fairly well with this pair, and it is probable that it belongs to this star. Σ 554 must be measurable before long, and should be watched with the large refractors. The proper motion of 80 *Tauri* is given:

Auwers	0″.072 in 93°.2
Weersma	0.067 in 97.7

I have collected for use hereafter the measures to this time, and the most important negative results:

1831.18	12°9	1″74	4*n*	Σ	
1836.96	9.8	1.5±	2*n*	Da	
1840.10	14.7	1.66	1*n*	Da	
1843.78	11.1	....	4*n*	Da	
1844.79	19.0	1.60	3*n*	Ma	
1848.09	10.6	1.7±	1*n*	Da	
1851.14	21.2	1.33	2*n*	Ma	
1851.85	8.4	1.61	1*n*	OΣ	
1852.15	24.3	1.29	1*n*	Ma	
1853.14	10.2	1.50	2*n*	J	
1854.67	20.9	1.30	2*n*	Ma	
1856.28	7.3	1.44	1*n*	J	
1858.09	8.0	1.56	2*n*	J	
1858.21	21.4	1.31	1*n*	Ma	
1859.15	10.6	1.41	1*n*	Da	
1862.95	9.6	1.13	4*n*	Δ	
1868.13	4.7	0.75	1*n*	Hd	
1872.18	Uncertain		1*n*	OΣ	
1872.99	1.7	1.52	1*n*	Bru	
1874.07	14.7	1.29	3*n*	WS	"Uncertain"
1878.51	7.2	0.58	2*n*	β	
1890.88	Single, 36-in.			β	
1891.73	Single, 36-in.			β	
1897.82	71.9	0.43	1*n*	β	
1899.71	Single, 36-in.			A	
1900.78	No certain elongation			β	
1902.74	No certain elongation			β	
1904.69	Single, 36-in.			Hu	

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...OΣ (**IX**)...Bp...Da^2...Da^3...Da^4...WJ...J^3...WS^2...Flm...Δ (1473)...Δ (**II**)...Hd...Sk^3...Bru^2...β^1...β^3...β (3048, 3114)...β (*Pub. L. O.* **II**)...Glasenapp (**II**)...HΣ (**XII**)...A (3638)...β^6...]

(See p. 1064)

23^m 30^s **2231. β 789.** Discovered with the 15½-inch at the Washburn Observatory. Probably fixed.

1888.22	322°3	1″30	3*n*	Com
1901.79	320.9	1.24	2*n*	Doo

[β (**XII**)...β^4...Com (*Pub. Washburn Obsy.* **VI**)...Doolittle (*A. J.* 547)...]

23 50 **2232. Σ 556 *rej.*** Given as Cl. I in *Catalogus Novus*, but probably an error, and therefore excluded in *Mensurae Micrometricae.* I could only find this faint pair (1876) with magnitudes as in H. The only measures since H are:

1895.21	284°9	5″22	1*n*	Leip	9.6...9.7

[H (**V**)...*A. G. Leipzig*, p. 246...]

23 55 **2233. O. Stone 8.** Discovered at the Cincinnati Observatory. No change.

1897.94	351°9	6″72	3*n*	Scott

[Cin^3...Cin^5...Cin^6...Wilson (Cin^{10})...Scott (*Mon. Not.* **LIX**, 427)...]

24 4 **2234. Σ 553.** Fixed. The proper motion is given 0″033 in 180° (*A. G. Harvard*).

1867.05	133°3	3″11	3*n*	Δ
1904.90	134.1	2.95	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XV**)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...]

2235. A. G. 80. Double in *A. G. Lund.* Measures by β^6. 24^m 12^s

2236. OΣ 84. (= **H 679.**) Without change. This is No. 2 of list of new pairs in Ma (XI). It is given in Sp (II) as Ma's pair. 24 39

1867.62	255°6	9″35	4*n*	Δ
1898.13	255.3	9.56	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Ba (**I**)...Sp (**II**)...Δ (**I**)...*A. G. Leipzig*, p. 246...Hu (*Pub. L. O.* **V**)...]

2237. H 1146. "Pos. est. from diagram = 55°, but the measured angle, 15°8, is distinctly registered." H (V) 41°6: 20″±: 7–8...12 (1830+). The R. A. of this observation is erroneous, but P and D as I found them in 1876. 24 39

1904.92	40°6	25″87	3*n*	Miller	8.2...10.2

2239. 57 *Persei.* Sh 44. (= **Ħ VI. 99 = OΣ (App) 50.**) B is B. A. C. 1397. The change is due to the proper motion of B: 24 58

Bossert	0″100 in 153°9
A. G. Bonn	0.076 in 157.7

1875.11	198°9	113″68	2*n*	Δ	5.2...6.2
1900.73	198.6	115.22	3*n*	β	

[Δ (**I**)...Bl (**V**)...Franz (3080)...β^5...]

2240. H 3653. B is O. Arg. S. 3130 (9), 1^{s}4 *f* and 45″ *s.* The only measures are: 25 7

1901.75	156°8	42″50	2*n*	β^5	8.3...8.5

2243. H 1147. Not in DM. The only measures are from the Kirkwood Observatory: 25 43

1904.93	97°2	18″12	3*n*	Cg	9.7...11.8

2244. Σ 560 *rej.* B is W^1 IV. 519 (9) 3^{s}6 *f*, and 16″ *n.* 25 53

1904.91	44°0	29″19	2*n*	Cogshall

2245. See 37. Discovered at the Lowell Observatory. 26 0

1899.72	37°9	11″48	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

2246. H 2234. The only measures are: 26 7

1904.92	270°1	36″61	3*n*	Miller	9.0...9.5

2247. Hd —. Noted "elongated" in *Harvard Zones.* Measures from β^5. No other observations. 26 11

2248. Ħ IV. 64. The only measures since Ħ are: 26 27

1903.98	117°1	124″78	2*n*	β^6	6...9.4

26^{m} 35^{s} **2249.** **Σ 557.** Relatively fixed. Both stars in DM.

1868.27	125°5	23″38	4*n*	Δ
1903.78	126.1	23.47	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^{6}...] (See No. 12998)

26 36 **2250.** **Σ 559.** (= **H̥ N. 132.**) Unchanged.

1866.25	277°9	2″90	3*n*	Δ
1892.99	278.5	2.92	2*n*	Gla

[Ma (*F. S.* **I**)...H^{1}...H^{2}...Ma (**XV**)...Bp...Da^{2}...Da^{3}...a (**II**)...Se...Se^{3} ...Ra (**XXV**)...Du...Δ (1118)...Δ (**I, II**)...Glasenapp (**II**)...Knorre (3518) ...*Annals Toulouse Obsy.* **III**...]

27 7 **2251.** **H 5461.** The only measures are:

AB	1904.10	101°5	25″47	2*n*	β^{6}	6.0...10.9
AC	1904.10	132.9	50.13	1*n*	β^{6}	...12.0

27 13 **2252.** **β 746.** Discovered with the 6-inch at Mt. Hamilton in 1879. The only measure is:

1895.10	11°9	1″05	3*n*	Sellors	7.9...9.0

[β (**XI**)...β^{2}...Sellors (3369)...]

27 25 **2253.** **S 451.** (= **OΣ (App) 51.**) B is Rad.[1] 1261. Probably unchanged.

1875.13	197°4	59″27	2*n*	Δ	7.1...7.5
1900.71	198.2	58.65	2*n*	β	7.3...7.7

[Δ (**I**)...Franz (3080)...β^{5}...]

27 28 **2254.** **Σ 564.** Unchanged.

1867.69	343°4	3″38	3*n*	Δ
1904.91	344.8	3.11	2*n*	Cogshall

[Ma (*F. S.* **I**)...H (**VIII**)...Se...Δ (**II**)...Cin^{5}...Cin^{6}...Wilson (Cin^{10})...]

27 35 **2255.** *Tauri* **278.** **Σ 562.** No material change.

1868.26	272°1	2″35	4*n*	Δ
1879.66	268.0	2.20	1*n*	Cin
1904.90	277.3	1.79	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{2}...Cin^{6}...]

28 . **2256.** **Lewis 4.** In the later publication this is identified as W^{2} IV. 583. R. A. = $4^{h}\,28^{m}\,40^{s}$; Decl. = 19° 38′.

[Lewis (*Mon. Not.* **LXII**, 385; **LXIV**, 792)...]

28 12 **2257.** **OΣ 85.** Ma (XI) 44°7 : 0″4 (1843.28) evidently belongs to some other pair. The measures are not very accordant, and change is doubtful.

1868.93	35°6	1″35	3*n*	Δ
1880.05	29.7	1.40	2*n*	Hl
1898.68	29.0	1.39	3*n*	Hu

[Ma (**XI**)...Δ (**I**)...OΣ (**IX**)...Flm...Sk^{3}...Hl (**II**)...Big (*Bul. Ast.* **XII**, 299) ...Hu (*Pub. L. O.* **V**)...]

28 15 **2258.** **A 113.** Discovered at the Lick Observatory. (*Bul. L. O.* No. 3) (*A. N.* 3741).

2259. **H 1148.** The only measures are: 28^{m} 17^{s}

1904.94	130°3	7″53	3*n*	Miller	9.6...10

2260. **Σ 563.** (= **H̥ III. 65 = Sh 365.**) Probably fixed. 28 21

1866.55	31°3	11″66	3*n*	Δ
1904.92	31.9	11.63	3*n*	Miller

[Ma (*F. S.* **I**)...Se...Bl (**V**)...Δ (1118)...Δ (**I, II**)...Espin (*Brit. Ast. Ass'n* **III**, 229)...]

2261. **H 344.** "Large star *very red;* small *dusky blue.*" 28 26
H (VII) 95° ± : 12″ ± : 8...9 (1823+). In DM 8.4 m; color at most only reddish (1876). Recent measures with the 40-inch, which shows a 14 m star, 82°2 : 17″5, give:

1900.76	102°2	11″17	2*n*	β^{5}	8.4...11.0

2262. **Hu 610.** Discovered at the Lick Observatory (*Bul. L. O.* No. 57). 28 34

2263. **Kr 24.** Noted as double in *A. G. Hels.* 28 40

1904.92	239°9	3″22	3*n*	Miller

[β (3042) (*Pub. L. O.* **II**)...]

2264. **Hu 611.** Discovered at the Lick Observatory (*Bul. L. O.* No. 57). 28 48

2265. **β 747.** Discovered with the 6-inch at Mt. Hamilton in 1879. The only measure is: 28 50

1894.09	218°4	2″25	2*n*	Sellors

[β (**XI**)...β^{2}...β (*Pub. L. O.* **I**)...Sellors (3303)...]

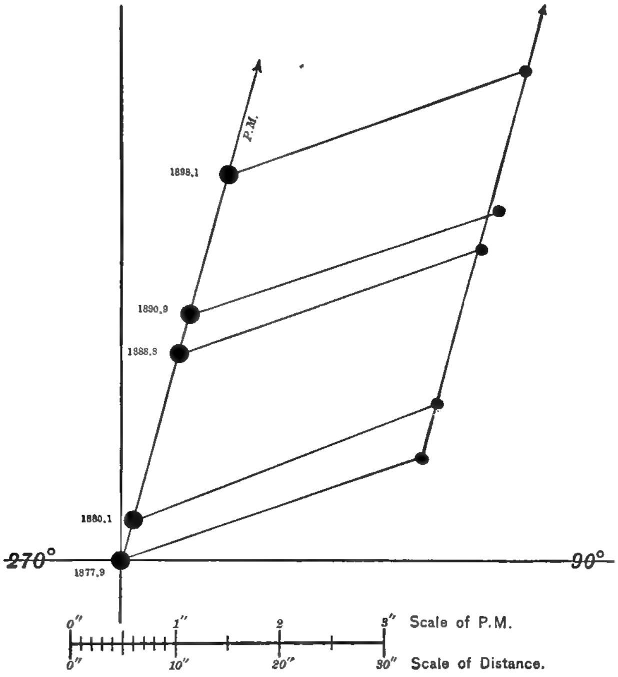
2266. *a Tauri* (**Aldebaran**). **β 550.** (CD = **β 1031**; AC = **H̥ VI. 66 = S 452 = Σ 2, App. I.**) The very faint companion to Aldebaran was discovered with the 18½-inch of the Dearborn Observatory in 1877, and the attendant to the distant Herschel companion with the 36-inch at the Lick Observatory in 1888. 29 2

The proper motion of *a Tauri* is 0″188 in 164°0 (Auwers), and the companion has exactly the same movement. There has been no relative change since the first observations in 1877. The following are the principal measures:

A and B (= β 550)

1877.89	109°0	30″45	3*n*	β
1878.00	110.5	31.26	3*n*	Hl
1880.11	111.2	31.46	2*n*	β
1888.82	109.5	30.90	2*n*	β
1890.87	109.0	31.34	3*n*	β
1897.79	108.8	31.03	3*n*	β
1898.10	109.7	31.30	3*n*	A
1899.14	110.8	31.08	3*n*	Lewis
1899.18	109.8	31.73		Gr. Obsy.
1900.02	109.7	31.57		Gr. Obsy.
1900.13	109.0	31.29	2*n*	Lewis

The observations credited to the Greenwich Observatory are from photographic plates. The common proper motion of these stars will be apparent from the following diagram, showing the several positions of both stars from 1877 to 1898, as given by the measures. The several places of A along the line separating this movement are derived from the proper motion of A, and the corresponding positions of B laid down from the measures. The scale of the distances AB is one-tenth that of the proper motion.



Proper motion of ALDEBARAN and companion.

The distant double companion is probably also a physical system, since the components have the same proper motion. This motion is almost exactly half that of A, and is perhaps larger than that of any known star as faint as this, which is not connected and moving with some brighter component. The measures of AC, 1836–98, taking into consideration the motion of A in space, give the annual proper motion of C as 0″094 in the direction of 112°2.

The following are all the measures of CD:

C and D (= β 1031)

1888.81	281°1	2″34	3*n*	β
1890.86	279.1	1.84	4*n*	β
1891.72	277.0	1.83	3*n*	β
1892.82	277.8	2.11	3*n*	Barnard
1897.82	276.9	1.62	1*n*	β
1897.83	276.9	2.16	1*n*	Barnard
1898.11	275.2	1.62	2*n*	A
1899.02	278.5	1.89	1*n*	β
1899.10	277.2	2.01	2*n*	Lewis
1899.64	275.1	1.95	2*n*	Barnard

A few of the measures of the Herschel star are given below. The early observations, made before the work of Σ, are not accurate in distance.

A and C (= Ħ VI. 66)

1836.06	36°0	109″04	2*n*	Σ	...11.2
1854.66	35.4	111.76	25*n*	OΣ	...10.6
1854.24	34.8	112.79	6*n*	Δ	...10.3
1887.00	34.5	116.27	20*n*	Hl	
1889.98	34.6	116.97	7*n*	β	
1898.10	34.3	117.90	4*n*	A	
1899.02	34.6	117.99	1*n*	β	
1899.20	34.4	117.89		Gr. Obsy.	
1900.02	34.1	118.27		Gr. Obsy.	

The last two are photographic. Espin measures a faint pair 62s *p* α *Tauri*, 331°2:3″73:11.7...11.7 (1901.13) 2*n*.

[β (**X, XIV**)...β1...β3...β (2189, 2875, 3048, 3114) (*Mon. Not.* **LI**, 311) (*Pub. L. O.* **II**)... Barnard (*A. J.* 447)... A (3584)... Greenwich Obsy. (*Mon. Not.* **LX**, 497, 517, 518; **LXI**, 486; **LXII**, 383) (*Gr. Obsns.* 1899, pp. 181, 247)...OΣ (**X**)....OΣ (*Mon. Not.* **XLIV**, 237) (*Bull. de l'Acad.* **XXVII**, 2)....Δ (1475)....Δ (**II**)...Hl (**I, II**)... Hl (*A. J.* 156)... Flm... Flm (*L'Ast.* **IV**, 102)... Pk... Espin (*Mon. Not.* **LXII**, 531)...β2...β (*Mon. Not.* **LI**, 311) (*Pub. Y. O.* **I**)... A (3584)...]

2267. 88 *Tauri*. **Sh** 45. (= **Ħ VI.** 31 = **OΣ (App)** 52.) 29m 3s

No evidence of change. The larger star has a proper motion of 0″056 in 163°3 (Auwers).

1875.33	299°0	69″23	3*n*	Δ	4.0...7.8
1903.78	299.3	69.35	2*n*	β	

[Δ (I)...Pk...β6...]

2268. 46 *Eridani*. **β** 881. Discovered with the 18½-inch. Slow angular motion, with no material change in the distance. Auwers gives the proper motion of the principal star, 0″008 in the direction of 212°5. (The R.A. in Part I is 1m too large. It should be 4h 28m 4s.) 29 4

1888.99	53°0	1″60	2*n*	T
1891.77	52.7	1.29	3*n*	β
1896.10	50.6	1.32	3*n*	Sp
1898.12	49.0	1.80	2*n*	A

[β (**XIII**)...β3...β (3114) (*Pub. L. O.* **II**)...T (2991, 3186)...Cin5...Sp (**III**)...A (3584)...Cogshall (*A. J.* 478)...]

(See p. 1064)

2269. **Σ** 570. (= **Ħ III.** 100 = **S** 453.) Fixed 29 31

1865.90	258°8	12″60	3*n*	Δ
1889.88	259.3	12.75	4*n*	Giacomelli

[Ma (*F. S.* **I**)...H (**V, VIII**)...P1...J2...WJ...Wr...Hd...Ma (**X**)...WS...Gl...Δ (**I, II**)...Δ (1118)...Cin4...Cin5...Giacomelli (**I**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

2270. **OΣ** 86. The pair is given in Hl (II) as discovered by Hastings. There may be some change in the angle, but the measures are not very satisfactory. 29 33

1843.28	67°3	0″55	1*n*	Ma
1852.09	79.7	0.45	1*n*	Ma
1868.51	72.6	Cun	4*n*	Δ
1882.11	67.1	0.54	4*n*	Hl
1891.01	62.6	0.52	3*n*	Hl
1898.75	63.0	0.60	3*n*	Hu
1903.13	62.5	0.43	3*n*	Bowyer

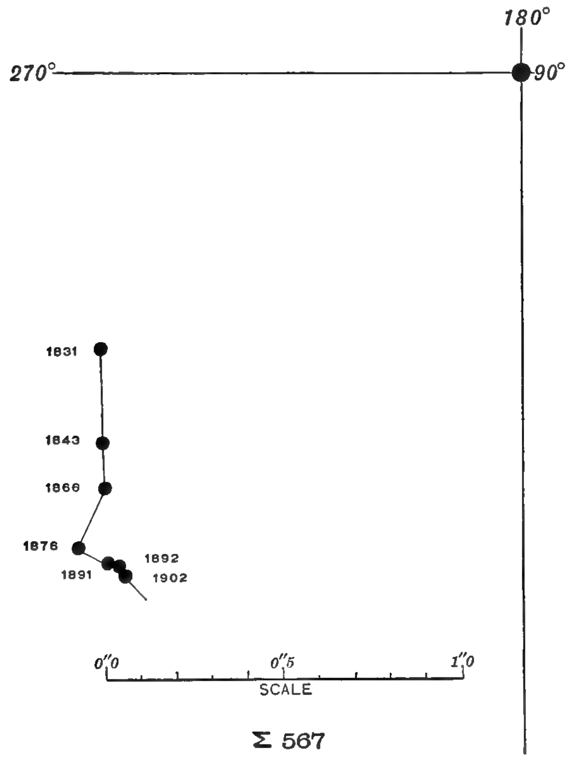
[Ma (**XI, XIII**)...Se...OΣ (**IX**)...Δ (**I**)...Hl (2430) (*Wash. Obsns.* 1882)...Hl (**II**)...β3...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

$29^{m}\ 39^{s}$ **2271.** OΣ 87. (= **H** 680.) Unchanged. H called the small star *purple.*

1866.66	234°8	5″89	3*n*	*Δ*
1898.15	234.3	6.09	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**) (**X**, p. 190)...Ba (**I**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

29 40 **2272.** Σ 567. For the first forty years after the measures of Struve the motion appeared to be rectilinear, but since 1876 the observations show no change in distance, and very little in angle. Probably binary.



Σ 567

1831.18	302°9	1″43	3*n*	Σ
1843.14	311.1	1.59	1*n*	Ma
1866.50	314.6	1.67	4*n*	*Δ*
1876.13	316.7	1.84	3*n*	Hl
1891.01	321.5	1.82	2*n*	Hl
1892.26	320.5	1.80	5*n*	HΣ
1902.37	319.5	1.82	6*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (1473)...*Δ* (**II**)...Hl (**I, II**)...Do (2307)...Flm...Big....Sk^{3}....T (3185)....Lewis (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...HΣ (**XII**)...]

29 41 **2273.** Σ 569. Fixed. The late measure is from the Kirkwood Observatory.

1866.20	133°8	8″09	3*n*	*Δ*
1904.93	134.6	7.82	2*n*	Duncan

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Bl (**V**)...*Δ* (**II**)...*A. G. Leipzig*, p. 246...*Annals Toulouse Obsy.* **III**...]

2274. Σ 565. Perhaps a little change in the angle. $29^{m}\ 42^{s}$

1868.82	175°2	1″60	4*n*	*Δ*
1892.91	173.2	1.70	3*n*	Jones
1900.78	173.8	1.55	2*n*	*β*

[Ma (*F. S.* **I**)....Ma (**XI**)....Se....*Δ* (**II**)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...*β*^{5}...]

(See p. 1064)

2276. **H** 3664. In *O. Arg.* 7-8 m. There is a smaller and more distant companion in 350°. The only measures are: 29 56

1837.95	189°7	22″42	1*n*	H	7 ...11
1896.16	192.1	21.61	3*n*	A	7+...10

[H^{3}...A (3395)...]

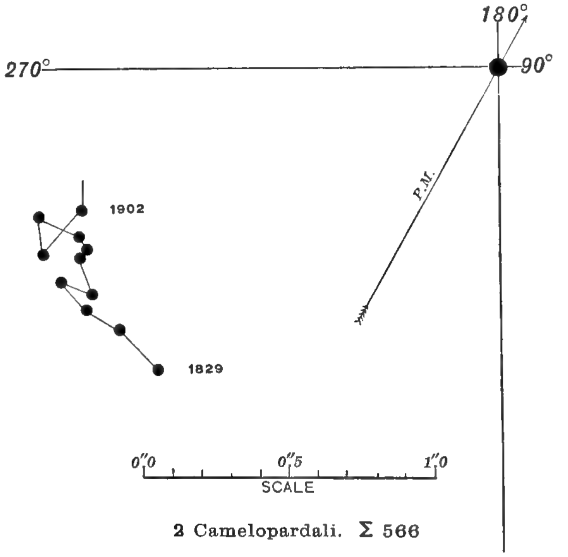
2277. Σ 571. (= **H** III. 95 = **H** 345.) Perhaps a little change in distance. Probably an error of 10° in angle of Secchi. 30 3

1866.98	257°5	17″56	3*n*	*Δ*
1879.31	258.5	17.34	3*n*	*β*
1904.94	258.9	17.26	2*n*	*β*

[Ma (*F. S.* **II**)...Ma (**XII**)..Se^{1}...*Δ* (**II**)...*β*^{1}...*β*^{3}...*β*^{6}...]

2279. 2 *Camelopardali.* **β** 1295. (AC = **Σ** 566.) The principal star of Σ 566 was found to be a close pair with the 40-inch in 1901. The proper motion of the system, and the non-discovery of this pair heretofore, make it certain at the beginning that it is a binary. The components have a proper motion of 0″100 in 153°2 (Porter). The later measures are: 30 27

1901.64	141°8	0″17	1*n*	Hu	6...8
1902.70	142.0	0.18	2*n*	Hu	
1904.65	138.9	0.19	1*n*	A	



2 Camelopardali. Σ 566

The apparent motion of C is practically rectilinear so far as appears from the measures, and the change may be explained by a slightly different proper motion from that of AB. The probabilities are, however, that the three stars form a physical system. The angles in some of the measures require a considerable correction. The distance has not sensibly changed.

1829.79	311°4	1″58	4*n*	Σ
1846.45	304.6	1.61	3*n*	OΣ
1864.19	300.3	1.67	6*n*	Δ
1868.75	296.0	1.70	2*n*	OΣ
1870.02	299.0	1.63	3*n*	Δ
1879.29	294.4	1.61	2*n*	Hl
1882.26	293.7	1.57	4*n*	Je
1888.92	291.9	1.58	3*n*	β
1890.95	287.8	1.69	2*n*	Hl
1895.92	292.2	1.72	2*n*	Collins
1901.05	288.7	1.54	3*n*	β

The faint star, C, was added with the 36-inch. The change in that corresponds exactly to the proper motion of A, and hence this star does not belong to the triple system. These are all the measures:

1888.92	209°8	23″66	3*n*	β
1901.05	212.8	23.26	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...H (**V**)...Da¹...J²...WJ²...Se...WS...WS² Flm...Do (2242, 2316) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Bl (**V**)... Je (2449)...En (2663)...T (2898)...Δ (1015, 1100)...⅃ (**I, II**)...Hl (**I, II**)... OΣ (**IX**) (**X**, p. 153)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Maw (**III**)...Sk⁵...β (*Pub. L. O.* **II**)...β⁵...]

30^{m} 28^{s} **2280.** 3 *Camelopardali.* **β 1043.** Discovered with the 36-inch. The principal star has a small proper motion of 0″020 in the direction of 196°0 (Auwers). It is very probable from the measures that the small star is moving with the other.

1898.80	294°3	3″95	3*n*	Barnard
1901.28	295.7	3.73	6*n*	β

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...β⁵...]

30 54 **2283.** **⅃ 4.** Discovered by Dembowski in 1867. He gives for the position of the larger component from A of 2 *Camelopardali*, 94°8 : 238″49 (1869.19) 2*n*. The later measures are:

1879.27	264°3	5″82	1*n*	OΣ
1888.03	265.3	5.87	2*n*	T
1902.70	264.2	5.98	2*n*	Hu

Espin measures a 12.5 companion, 69°0 : 18″04 (1892) 3*n*.

[Δ (**II**, p. 102)....OΣ (**X**, p. 126)....T (2898)....Espin (*Ast. and A.-P.* **XII**, 282) (*Brit. Ast. Assn.* **III**, 227)...Hu (*Bul. L. O.* No. 44)...]

31 4 **2284.** *Aurigae* 4. **Σ 572.** (= **S 454.**) Apparently slow motion in angle, with small increase in distance. Nothing can be inferred from the measures as to the character of the motion.

1869.81	204°7	3″36	5*n*	Δ
1880.20	204.7	3.77	3*n*	Je
1882.70	203.4	3.57	4*n*	En
1884.08	203.4	3.58	5*n*	Per
1890.97	201.6	3.63	3*n*	Hl
1903.35	201.3	3.55	3*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XV**)...Wr...Da²...Gl...Se...Se³...Δ (1109)...Δ (**I, II**) ...En (1673, 2663)...Du...WS...WS²...Flm...Sk...Je (2329)...Per...Per (2684)...Big...Hl (**I, II**)...Hayn (3051)...T (2941)...Jones (*A. J.* 312)... Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 497; **LXI**, 476; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)... Ebell (3321)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Maw (**IV**)...Sk⁵...]

2285. **OΣ (App) 53.** Measures from ⅃ (I). Nothing later. 31^{m} 16^{s}

2286. **β 185.** Discovered with the 6-inch. Relatively fixed. 31 24

1888.10	236°7	3″03	2*n*	T
1898.16	236.4	3.09	1*n*	See

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (I)...Cin⁴...Cin⁵...Tarrant (2991)... See ( )...]

2287. 51 *Eridani.* **β 88.** Distant companion noted with the 6-inch. The proper motion of 51 *Eridani* is 0″081 in the direction of 151°2 (Auwers). The measures do not cover a sufficient time to show whether or not the small star has the same movement. It is probably only an optical pair. 31 34

1898.72	89°6	32″03	2*n*	β
1904.94	87.9	31.78	2*n*	β

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... β⁶...]

2288. **Weisse 4.** W IV. 643 is described "duplex 3″" in that catalogue. That star is not double, but No. 647, about 5′ *s*, is double and is given here with measures from β⁵. I do not find any other observations. 31 42

2292. **See 38.** The only later measures are: 32 22

1899.72	236°6	6″32	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

2293. σ^1 and σ^2 *Tauri.* **Σ 11, App. I.** The proper motions of these stars are given in the *Greenwich Ten-Year Catalogue:* 32 24

A (σ^2 *Tauri*)	0″075 in 106°9
B (σ^1 *Tauri*)	0.067 in 168.9

The measures in Se¹ belong to Σ 10, App. I.

1864.85	192°5	430″64	8*n*	Δ
1879.32	192.6	429.23	5*n*	Je
1890.1	192.9	430.57		Gr. Cat.
1893.05	192.9	431.73	2*n*	Gla

[Ra (**XXXI**)...Δ (**II**)...Je (2329)...Δ (1475)...Glasenapp (**II**)...]

2294. **Σ 576.** Without change. 32 26

1867.18	171°7	12″31	3*n*	Δ
1889.58	171.9	12.37	8*n*	Giacomelli

[Ma (*F. S.* **I**)...H (**VIII**)...Δ (1118)...Δ (**I, II**)...Cin⁵...Wilson (Cin¹⁰)...T (2991)...Giacomelli (**I**)....Glasenapp (**II**)...Solá (3563)...*Annals Toulouse Obsy.* **III**...]

32^m 32^s **2296.** Σ 575. No material change.

1867.63	158°0	4″81	3*n*	Δ
1897.63	157.9	4.98	5*n*	Doo

[Ma (*F. S.* I) ... Δ (II) ... Doolittle (*Pub. Flower Obsy.* I) ...]

32 32 **2297.** β 882. Discovered with the 18½-inch. The *np* of two small stars in the same field. Probably unchanged.

1891.89	226°4	2″25	3*n*	β
1898.83	224.5	2.70	1*n*	Bd
1898.96	228.2	2.28	1*n*	β
1900.85	225.8	2.35	4*n*	Doo

[β (**XIII**) ... β^3 ... β (3114) ... β (*Pub. L. O.* **II**) ... Boothroyd (*A. J.* 478) ... Doolittle (*A. J.* 547) ...]

33 · **2301.** **Lewis 5.** Place approximate. Possibly it is β 1044, with an error of 10° in his declination. No other observations.

[Lewis (*Mon. Not.* **LX**, 497) ...]

33 1 **2302.** β 1044. Discovered with the 36-inch. It is 3^m 59^s *f Aldebaran.* The later measures are:

1898.11	220°2	0″93	2*n*	A
1900.92	227.8	0.83	4*n*	Doo
1903.88	213.3	0.77	2*n*	β

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... A (3584) ... Doolittle (*A. J.* 547) ... β^6 ...]

33 28 **2303.** Σ 574. Fixed.

1866.50	312°4	4″01	3*n*	Δ
1904.90	311.9	3.93	3*n*	Cogshall

[Ma (*F. S.* I) ... H (**V**) ... Wr ... Δ (**II**) ...]

33 49 **2304.** **H 346.** **B. A. C. 1444.** R. A. in W^2 1^m less. The only measures are:

1901.75	54°6	43″32	2*n*	β^5	6.1 ... 11.0

33 50 **2305.** Σ 578. Probably unchanged.

1867.56	27°0	11″07	3*n*	Δ
1901.63	26.7	11.55	2*n*	Kustner

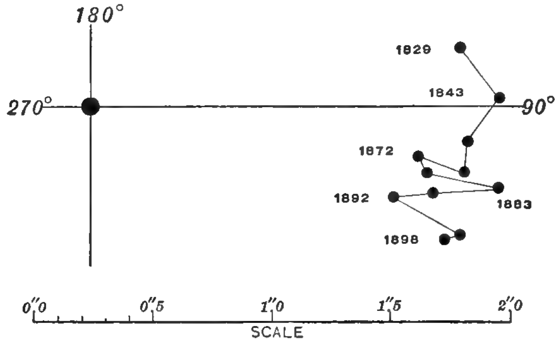
[Ma (*F. S.* I) ... Ma (**XI**) ... Δ (**II**) ... Kustner (3821) ...]

33 58: **2306.** **H 25.** The 40-inch shows a nearer companion:

AB	1904.00	97°6	6″30	2*n*	β^6	10 ... 12
AC	1904.00	312.0	15.20	2*n*	β^6	.. 11.7

34 9 **2307.** Σ 577. Slow retrograde motion in angle, the distance remaining constant. Probably binary, but this will be uncertain for a long time so far as the measures are concerned.

1829.57	98°7	1″58	3*n*	Σ
1843.90	90.8	1.73	2*n*	OΣ
1863.47	84.5	1.60	5*n*	Δ
1870.75	79.7	1.61	2*n*	OΣ
1872.42	80.9	1.41	2*n*	Δ
1879.30	79.0	1.45	3*n*	Hl
1883.34	78.6	1.76	6*n*	En
1890.97	75.6	1.49	3*n*	Hl
1892.92	73.2	1.34	2*n*	Jones
1894.04	70.8	1.66	2*n*	Big
1898.09	69.6	1.60	2*n*	A



Σ 577

[Ma (*F. S.* I) ... Ma (**XIII, XV**) ... Se ... WS ... WS^2 ... Gl ... Δ (1185, 1473) ... Δ (**I, II**) ... Do (2196, 2303) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Flm ... Pl ... Sk ... Bl (**V**) ... Per ... Per (2748) ... OΣ (**IX**) ... Hl (**I, II**) ... T (2991) ... En (2663) ... Hayn (3051) ... Jones (*Proc. Haverford Coll. Obsy.* 1892) ... Lewis (*Mon. Not.* **LIV**, 314) .... Glasenapp (**II**) .... Big (*Bul. Ast.* **XII**, 299) .... A (3584) ... HΣ (**XII**) ... Sk^5 ...]

2309. β 1236. Discovered with the 36-inch. A and C are respectively, O. Arg. S. 3268 and 3266. No other measure of the close pair. 34^m 27^s

	A and C			
1899.09	313°7	40″13	1*n*	β
1899.11	313.9	40.53	1*n*	A

[β (**XVIII**) ... β (3113) (*Pub. L. O.* **II**) ... A (   ) ...]

2310. Σ 579. Perhaps a little change in angle. 34 32

1867.16	33°7	16″39	3*n*	Δ
1889.33	33.9	16.42	3*n*	HΣ
1901.78	34.6	16.37	2*n*	β

[Ma (*F. S.* I) ... Ma (**XI, XIII**) ... Δ (**II**) ... Flm ... Sk ... WS^2 ... HΣ (**XII**) ... Sk^5 ... β^5 ...]

2311. **Howe 11.** Discovered by Howe at Cincinnati. 34 33

1881.74	95°9	3″20	1*n*	Wilson

[Cin^4 ... LM ... Wilson (Cin^{10}) ...]

2312. Σ 583. (= **Ḥ II. 81 = S 456.**) The distant star from S; not in Σ. No change in AB. 34 45

AB	1867.92	325°8	5″76	4*n*	Δ
	1904.92	330.7	5.56	3*n*	Miller
AC	1904.91	265.6	100.00	2*n*	Miller

[Ma (*F. S.* I) ... Ma (**XI, XII**) ... Hd ... Δ (**II**) ... Pl ... WS^2 ...]

35^m 3^s **2313.** τ *Tauri.* **S 455.** (= **♅ VI. 7** = σ 134 = **OΣ (App) 54.**) Large star supposed to be a close pair from an occultation observed by Hough (*A. J.* 474). It is also a spectroscopic binary, discovered by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XVII, 246). This star has a proper motion of 0″016 in 237°0 (Auwers). There is no change in the Herschel star.

1875.35	212°4	62″85	2*n*	Δ	5.0...7.2
1892.43	212.7	63.07	4*n*	Franz	4.5...7.2
1900.68	213.1	62.98	2*n*	β	

[Ra (**XXII**)...Pk...Δ (**I**)...Franz (3464)...Ho (*A. J.* 474)...β^5...]

35 12 **2314.** 54 *Eridani.* **O. Stone 9.** Suspected to be a close pair at Cincinnati, and subsequently observed by Δ. I was unable to see any elongation with the 18½-inch, and it was certainly single with the 36-inch in 1891. Not given in the Cincinnati Publications.

[Δ (**I**, p. 377)...β (3114) (*Pub. L. O.* **II**)...]

35 15 **2315.** **H 348.** (= **Σ 580** *rej.*) "Small star *blue*," H. Another obs. mags. 7...10. In W² 8m; in Σ Cl. IV, 7...9-10. The only measures are:

1904.92	284°6	30″56	3*n*	Cogshall	6.3...10.6

[H (**VII**)...]

35 37 **2316.** **Σ 582.** Fixed.

1866.15	24°4	5″63	3*n*	Δ
1904.36	22.0	5.40	2*n*	β

[Ma (*F. S.* **I**)...Bl (**V**)...Δ (**II**)...β^6...]

35 37 **2317.** **Σ 581** *rej.* In the field with Σ 582. Measures by β^6.

35 44 **2318.** **H 3677.** Probably unchanged.

1836.41	170°9	11″25	2*n*	H^3
1876.02	173.9	12.23	2*n*	Cin^3

35 47 **2319.** **Ho 332.** The only measures since Ho (3233) are:

1904.90	126°8	1″04	3*n*	Cogshall

(See p. 1064)

36 2 **2320.** **Ho 333.** A 12m star, 220°: 34″.

1904.90	160°3	2″06	3*n*	Miller

[Ho (3233)...]

(See p. 1064)

36 18 **2322.** **A. G. 81.** Measures from *A. G. Leipzig*, p. 246.

36 21 **2323.** **Σ 585.** Dembowski could not see the small star 1865.81; very plain with the 6-inch Dec. 1874. No evidence of change in position.

1880.31	275°3	11″99	3*n*	β
1900.72	275.8	11.95	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1736)...β^1...β^3...β^5...]

2328. **H 2238.** "Difficult; in field with Σ 590." The only measure is: 37^m 25^s

1903.80	73°3	19″25	1*n*	β^6	12.8...13

2330. 55 *Eridani.* **Σ 590.** (= **♅ III. 99** = **Sh 46**). No relative change. The large star is given a proper motion of 0″024 in 205°2 (Auwers). 37 50

1865.81	316°1	9″00	3*n*	Δ
1889.94	316.3	9.05	6*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**X**, **XI**, **XIII**)...H (**V**, **VIII**)...Ra (**XXII**)...WJ...J^2...P1 Wr...Δ (1118, 1256)...Δ (**I**, **II**)...Cin^5...Wilson (Cin^{10})...Giacomelli (**I**)... Glasenapp (**II**).... Scott (*Brit. Ast. Ass'n* **V**, 75).... Solá (3563).... *Annals Toulouse Obsy.* **III**...Do (3798, 3799)...]

2329. **Σ 588** *rej.* The 40-inch shows a star nearer than the Struve companion: 37 32

AB	1902.86	90°4	8″70	2*n*	β^6	8.0...13.5
AC	1902.86	280.6	36.83	2*n*	β^6	... 9.5

2331. **A 114.** Discovered at Mt. Hamilton by Aitken (3741) (*Bul. L. O.* No. 3). 37 50

2332. **Hall.** Discovered by Hall (II). Identified and measured: 37 53

1901.75	156°4	2″42	3*n*	β^5	9.1...9.1

2333. **Σ 584.** (= **♅ II. 92.**) ♅ in 1783.3 found 112°7, 38 8
but this is probably an error, as there has been no change since Σ.

1866.44	121°2	11″84	3*n*	Δ
1904.90	122.6	11.42	3*n*	Cogshall

[Ma (*F. S.* **I**)...H (**IV**)...Δ (**II**)...Do (2989) (*Trans. R. I Acad.* **XXIX**, Part 13)...]

2335. **Hu 612.** Discovered at Mt. Hamilton by Hussey (*Bul. L. O.* No. 57.) 38 18

2336. **Σ 589.** There is some change in the angle. Boss (*A. G. Albany*) gives for the proper motion of A, 0″16 in 248°2, and for B, 0″128 in 242°0. The apparent movement of B appears to be rectilinear. 38 27

1831.39	310°9	4″47	3*n*	Σ
1857.08	304.8	4.36	2*n*	Se
1863.72	303.0	4.45	3*n*	Δ
1872.95	305.6	4.45	1*n*	OΣ
1876.04	300.1	4.60	3*n*	Hl
1888.13	299.9	4.57	3*n*	Hl
1892.78	300.6	4.73	2*n*	Jones
1897.56	297.2	4.56	5*n*	Doo
1902.97	297.6	4.49	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Bp...Se...Ba (**II**)...Ra (**XXV**)?...En (1673)... OΣ (**IX**)......Δ (1204, 1473)...Δ (**I**, **II**)...Gl...Do (2242, 2989, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...WS^2...Sk^2...Flm...Hl (**I**, **II**)...T (2991)... Jones (*Proc. Haverford Coll. Obsy.* 1892)...Lv^1...Glasenapp (**II**)...Sk^4... Doolittle (*Pub. Flower Obsy.* **I**)...*A. G. Leipzig*, p. 246...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

38^{m} 31^{s} **2338.** Σ 587. (= **H IV. 73.**) Fixed. For Σ 586 *rej.*, in the same field, H (V) gives, 130°2: 20″±: 10...10 (1830+).

1866.15	185°0	20″73	3*n*	Δ
1901.51	183.6	21.04	2*n*	Es

[Ma (*F. S.* II)...H (V)...Δ (II)...Espin (*Mon. Not.* **LXIV**, 676)...]

38 48 **2339.** **A. G. 82.** Noted as double in *A. G. Christiania.*

[β (*Pub. L. O.* II)...]

38 51 **2340.** Measured by β^5 in trying to identify **Σ** 593 *rej.* (No. 2348).

39 2 **2341.** **H 1151.** Magnitudes in H (V), 9–10...13...13.

AB	1904.93	10°3	9″76	2*n*	Miller	10...14

39 27 **2343.** **Σ** 591 *rej.* Two stars in the same field, each with a smaller companion. The *f* one is Σ 592 *rej.* Measures by β^6.

39 36 **2344.** **Σ** 592 *rej.* Measures by β^6.

40 **2348.** **Σ** 593 *rej.* No such pair in this place. An 8 m star some distance *sf* has a very distant 11 m companion, but neither that nor No. 2340, which was measured in this search, is likely to be the **Σ** pair.

[β^5...]

40 7 **2349.** **H 349.** (= **Ku 19.**) "Both white; a pretty double star." H (VII) 0°±: 5½″±: 10...10+. Examined (1876) and H's first angle and distance more nearly correct.

1901.57	87°3	10″54	2*n*	Kustner (3821)	9.8...10.1

40 10 **2350.** **β 186.** Discovered with the 6-inch.

1886.61	177°5	1″79	2*n*	Lv
1888.10	178.1	1.63	2*n*	T
1888.50	176.1	1.76	2*n*	LM
1898.71	176.7	1.54	1*n*	β
1898.92	181.6	1.65	3*n*	Bd

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382)... Δ (I)... Cin^4... Cin^5... Lv^1... LM ... T (2991)...Boothroyd (*A. J.* 478)...]

40 15 **2351.** **Hu 104.** (AC = **Σ 596.**) The principal star of Σ 596 was discovered to be a close pair by Hussey. No other measures. Some change in the Σ companion; probably rectilinear motion.

1866.99	284°8	10″35	4*n*	Δ
1877.97	287.3	10.75	2*n*	β
1888.15	292.4	11.16	3*n*	T
1896.16	288.1	10.19	3*n*	A

[Ma (*F. S.* I) ... Ma (**XI, XII**) ... H (**VIII**)...Δ (1735)...Δ (II)...Gl...Flm... Pt...WS...β^1...β^3...T (2991)...Cin^5...Glasenapp (II)...A (3395, 3584)... Hu (*A. J.* 485)...]

2354. **H 3260.** Nothing since Herschel except the following: 40^{m} 51^{s}

1903.21	61°4	14″34	2*n*	Cogshall	9.5...10

2355. **Σ** 597 *rej.* The only observation since Struve is: 40 55

1904.93	288°2	28″17	2*n*	Miller	8.8...11

2356. **Σ** 594 *rej.* The only measures are: 41 16

1904.35	333°3	9″22	2*n*	β^6	9.4...11.1

2357. **Σ** 598. Fixed. Error of 100° in angle of Ma. 41 37

1866.26	317°8	9″45	3*n*	Δ
1893.12	317.4	9.01	2*n*	Gla

Ma (*F. S.* I)...Ma (XI)...Δ (II)...Glasenapp (II)...]

2358. **H 684.** (= **Σ** 601 *rej.*) "Two in a small cluster of 8 stars." No later observations. 41 51

2359. **Arg. 11.** "Double Cl. IV" in O. Arg. S. B is SD (17°) 951. Measures by β^6. 41 53

2363. **Σ** 599. Without change. 42 24

1866.25	335°4	10″25	3*n*	Δ

[Ma (*F. S.* I)...H (V)...Bl (V)...β^2...Δ (II)...]

2366. **β 312.** (= **Hd 68.**) Discovered with the 6-inch. Relatively fixed. 42 36

1877.52	343°6	3″29	2*n*	Cin
1888.15	345.8	3.26	3*n*	Hl
1898.88	344.5	3.43	2*n*	Bd

[β (VI)... β (2062)... Cin^3... Cin^4... Hl (I, II)... Hd... Boothroyd and Cogshall (*A. J.* 478)...]

2368. 96 *Tauri.* **β 551.** (AB = **H 3261.**) The faint attendant to Herschel's companion was noted with the 18½-inch. There is another faint star in the group. It is probably a perspective pair only. 42 52

The proper motion of the principal star is small, 0″010 in 351°8 (Auwers).

B and C

1891.94	205°5	5″83	3*n*	β
1898.72	205.0	6.21	2*n*	β

A and B

1891.94	57°0	29″79	3*n*	β
1898.72	56.4	29.37	2*n*	β

[β (X)...β^1...β (3114)(*Pub. L. O.* II)(*Pub. Y. O.* I)...]

2369. **H 3690.** "P of small star est. from diagram." The only measures are: 42 56

AB	1903.86	34°4	29″97	1*n*	β^6	8.2...11.3
AC	1903.86	194.6	31.82	1*n*	β^6	...10.6

$43^m\ 18^s$ **2371.** **H 350.** "Extremely delicate and beautiful." This is in the field with DM (34°) 914.

1900.81 308°2 5″14 2*n* β^5 11...11

43 40 **2375.** **Σ 609.** (= **H 686.**) Dembowski noted it as single 1865.9 and 1866.1 with good conditions. I failed to see or find it on a good night about 1876. Later it was very readily seen as described by Σ, and was noted as an easy pair of about 8½ m. The place in *Pos. Med.* is that of the 7 m star W¹ IV^h. 936. Σ's star is 9m in DM and is $54^s.1$ *p* and 2′0 *n* of the other. This agrees in R. A. substantially with H 686, given without measures as a "close double." They are certainly identical. It is noted as double in the *Harvard Zones*. There would seem to be some change in angle and distance. The character of the motion is uncertain.

1878.09	75°6	2″70	2*n*	β
1879.77	74.0	2.54	1*n*	Cin
1893.13	78.0	2.26	2*n*	Gla
1899.12	74.3	2.45	3*n*	A

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**V, VII**) ... Δ (1736) ... β¹ ... β (*Mon. Not.* **XXXIV**, 372) ... Cin⁶ ... Glasenapp (**II**) ... A (3638) ...]

43 43 **2376.** **Σ 558.** Change doubtful.

1866.80 201°7 3″14 3*n* Δ

[Ma (*F. S.* **I**) .... Ma (**XI**) ... Δ (**II**) ...]

(See p. 1064)

44 12 **2378.** **Σ 605** *rej.* Place reduced from H (V), 281°8: 10″± : 11 ... 11 (1830+).

44 12 **2379.** **H VI. 83.** The only observation since 1783 is:

1900.71 3°9 95″93 2*n* β^5 7.0...8.5

44 33 **2381.** **β 883.** This very remarkable and interesting binary system was discovered with the 18½-inch. The motion has been rapid, and considerably more than one revolution has already been passed over by the companion. It is always a difficult pair. The maximum distance probably does not exceed 0″25.

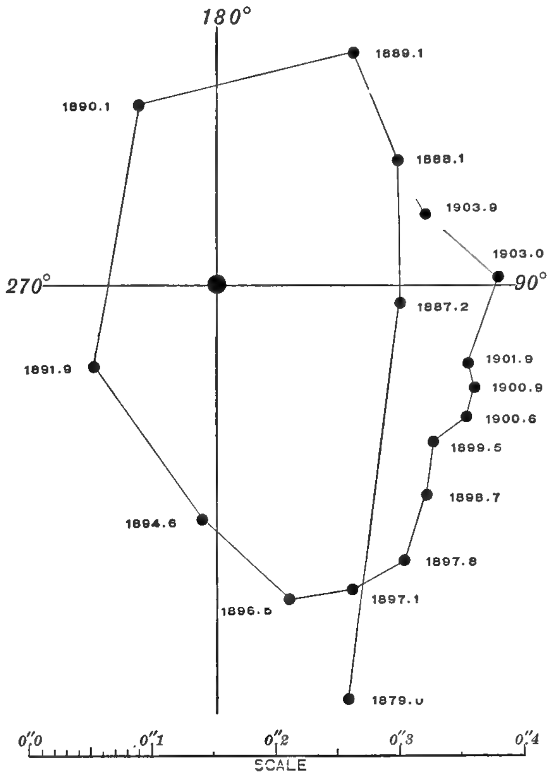
Three orbits have been found for this pair. The dates of the last measures used in the computations, and the periods are as follows:

1891.97	Glasenapp	16.35 yrs.	*A. N.* 3119
1897.19	See	5.5	*Mon. Not.* LVII, 577
1900.16	Lewis	15.8	*Mon. Not.* LX, 492

It is certain that the short period, which resulted from reversing a few of the angles, and not using some of the measures, cannot be correct, and that the true period will not be far from the larger values given above. It is probable that in the next three or four years the companion will reach the point in the apparent orbit where it was at the time of my first measures at the Lick Observatory in 1891, and then the elements of the orbit should be fairly well known. In the meantime the values can be only approximate at the best.

This star, according to Porter, has no sensible proper motion.

All the measures of the close pair are given below. Some of the most reliable positions, from observations with large apertures, are shown on the accompanying diagram.



β 883

A and B

1879.00	17°5	0″35	1*n*	β
1887.17	84.7	0.15	3*n*	Sp
1888.09	124.4	0.18	2*n*	Sp
1889.15	149.6	0.22	4*n*	Sp
1890.14	203.4	0.16	3*n*	Sp
1891.08	Single		7*n*	Sp
1891.14	Single with 36-inch		2*n*	β
1891.97	303.1	0.12	3*n*	β
1894.66	356.3	0.19	3*n*	Barnard
1895.74	6.4	0.39	1*n*	See
1895.74	8.9	....	1*n*	Moulton
1896.10	8.9	0.25±	12*n*	Sp
1896.88	16.9	0.28	3*n*	A
1896.97	28.3	0.24	10*n*	See
1897.00	25.5	....	1*n*	Dyson
1897.13	23.8	0.27±	3*n*	Sp
1897.16	36.0	0.35	1*n*	Moulton
1897.62	37.9	0.28	1*n*	Cogshall
1897.66	36.1	0.35	5*n*	Lewis
1897.72	30.2	0.25	2*n*	Do
1897.76	32.7	0.21	3*n*	Barnard
1897.78	37.9	0.31	2*n*	See
1897.81	33.6	0.25	2*n*	β
1897.83	31.5	0.28	6*n*	A

1897.83	45°.7	0″.31	1*n*	Boothroyd
1897.90	34.7	0.39	1*n*	Bowyer
1897.90	34.7	0.39	2*n*	Brown
1897.95	34.8	0.27	3*n*	Hu
1898.08	41.3	0.23	1*n*	Hu
1898.09	37.7	0.26	6*n*	A
1898.09	38.7	0.32	2*n*	Lewis
1898.18	24.8	0.25	2*n*	Sp
1898.26	42.9	0.31	1*n*	Boothroyd
1898.69	43.9	0.28	5*n*	A
1898.74	45.3	0.19	3*n*	Barnard
1898.74	46.0	0.24	2*n*	β
1899.07	50.1	0.36	6*n*	Lewis
1899.20	54.5	0.20	3*n*	A
1899.75	58.7	0.38	1*n*	See
1899.75	54.4	0.25	7*n*	A
1899.78	54.0	0.22	4*n*	Barnard
1900.15	57.1	0.25	1*n*	A
1900.15	60.4	0.26	3*n*	Lewis
1900.18	62.6	0.27	1*n*	Bryant
1900.21	63.3	0.27	6*n*	Bowyer
1900.64	61.3	0.23	3*n*	A
1900.80	66.1	0.22	2*n*	Doo
1900.91	67.4	0.21	2*n*	A
1900.92	70.0	0.24	1*n*	Hu
1901.12	59.7	0.31	2*n*	Bowyer
1901.38	64.2	0.26	3*n*	Bryant
1901.61	68.8	0.38	3*n*	Lewis
1901.72	75.8	0.21	2*n*	A
1901.98	70.3	0.22	2*n*	Doo
1902.01	69.6	0.33	1*n*	Lewis
1902.19	78.3	0.30	1*n*	Bowyer
1903.04	91.6	0.23	3*n*	Lewis
1903.94	108.9	0.18	4*n*	A
1903.96	111.3	0.17	1*n*	β

AB and C

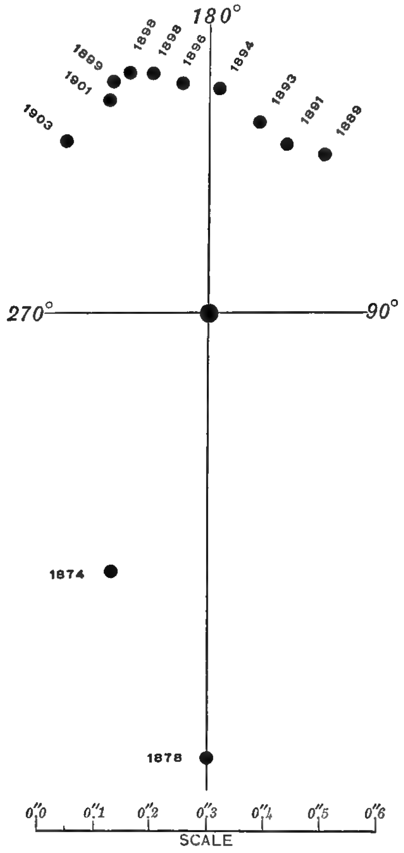
1879.00	148°.5	18″.35	1*n*	β
1891.05	152.2	18.22	1*n*	β
1897.74	154.7	17.74	1*n*	Barnard
1897.80	153.1	18.04	1*n*	Lewis
1897.98	153.9	17.92	1*n*	Bowyer
1898.56	154.8	17.75	2*n*	A
1898.74	154.7	17.74	1*n*	Barnard
1902.08	156.8	17.85	2*n*	Lewis

[β (**XIII**)...β3...β (3048, 3114)(*Pub. L. O.* **II**)...Sp (**III**)...Glasenapp (3119)...Comstock (*Pub. Washburn Obsy.* **X**)....See (3496, 3594)(*Mon. Not.* **LVII**, 577; **LVIII**, 385)(*Pop. Ast.* **V**, 245)(*A. J.* 359)...Barnard (*A. J.* 435, 447, 477)...Hu (*A. J.* 427)(*Bul. L. O.* No. 44) Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I**)...Biesbroeck...A (3465, 3638)(*A. J.* 415, 429)(*Pub. A. S. P.* **IX**, 238; **XII**, 31)(*Bul. L. O.* No. 11)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 492, 497; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...β6...]

(See p. 1064)

$45^m\ 4^s$ **2383.** **β** 552. *Orionis* 11. This pair was discovered with the 18½-inch in 1877, but in looking over the old observing books used with the 6-inch, I find that on December 14, 1874, this star was noted as "possibly a close pair," and the angle and distance estimated as given below. It seems to have received no further attention with the small telescope, and was discovered independently three years later with the large refractor of the Dearborn Observatory.

There seems to be something singular about the appearance and difficulty of this pair at times with large apertures. It was not noted as difficult at the time of the observation in 1877. In 1890 it was a hard star with the 36-inch, and on two nights in 1892, under favorable conditions, I failed to see it double at all. Since then it has been measured by several observers, and apparently the change is slow in the last ten years. As the components are very unequal, there can be no uncertainty about the quadrant.



β 552

1874.95	340°±	0″.5±		β
1877.97	360±	0.8±	1*n*	β
1886.19	265.0?	0.5±	1*n*	HΣ
1886.22	.....	Single	1*n*	HΣ
1889.19	144.7	0.35±	1*n*	Sp
1890.96	156.7	0.33	3*n*	β
1891.13	153.8	0.3±	8*n*	Sp
1892.06	Apparently single with 36-inch		2*n*	β
1893.07	165.3	0.35±	1*n*	Sp
1894.15	178.2	0.38±	2*n*	Sp
1894.88	177.0	0.40	2*n*	Barnard
1896.11	179.9	0.35±	7*n*	Sp
1896.84	187.7	0.43	1*n*	Hu
1896.88	186.2	0.40	3*n*	A
1897.13	193.5	0.25±	2*n*	Sp
1897.82	193.7	0.44	5*n*	A
1897.95	193.4	0.43	3*n*	Hu
1898.01	189.9	0.45	2*n*	Lewis
1898.12	197.2	0.43	3*n*	A
1898.74	199.1	0.45	3*n*	A
1899.75	202.3	0.60	1*n*	See

1899.79	202°8	0″45	3*n*	A
1899.85	207.3	0.42	3*n*	Lewis
1900.64	205.4	0.41	3*n*	A
1900.78	203.2	0.49	3*n*	Doo
1901.72	205.8	0.43	2*n*	A
1901.98	203.3	0.56	2*n*	Doo
1902.74	229.3	0.32	1*n*	β
1903.14	220.0	0.40	4*n*	A
1904.19	217.8	0.52	2*n*	Biesbroeck

Porter finds no evidence of proper motion in the meridian positions. To aid in determining this later I have measured a distant 13m star in the field:

1898.11	212°7	44″88	3*n*	β
1902.79	212.4	44.93	3*n*	β

[β (**X**)...β^1...β (3048, 3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β^6...Sp (**III**)... HΣ (**XII**)...Barnard (*A. J.* 447)...Hu (*A. J.* 397, 427)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486)....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**).... A (3465, 3584, 3638) (*A. J.* 415, 429) (*Bul. L. O.* No. 11)...Biesbroeck...β^6...]

(See p. 1064)

5^m 5^s **2385.** **Σ 603.** (= **H** **N.** 77.) Without change.

1866.51	240°1	8″43	3*n*	Δ
1901.04	239.2	8.28	1*n*	Es

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIII**)...Se...Δ (1204)...Δ (**I, II**)...Bl (**V**)... Espin (*Mon. Not.* **LXIV**, 676)...]

45 14 **2386.** 5 *Camelopardali.* **β 1187.** Discovered with the 36-inch. The proper motion of this star is 0″018 in the direction of 241°1 (Auwers). If the small star is fixed in space, its distance should decrease annually by this amount. The only later measures are:

1898.84	246°0	12″70	2*n*	β
1904.97	246.0	12.86	2*n*	β

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...β^6...]

45 47 **2389.** **Σ 607.** Place at first reduced from H (VI), and subsequently identified in DM. Not seen by Dembowski in 1866-67; and I could not see the companion with the 6-inch in 1873. Ma (XV) has a measure 271°8 (1858.1) which evidently belongs to another pair. The measures thus far indicate no change in position.

1875.09	254°6	13″74	1*n*	WS
1879.02	249.7	14.10	5*n*	β
1903.84	250.3	14.19	2*n*	β

[Ma (*F. S.* **I**)...Δ (1736)...WS^2...β^1...β^3...β^6...]

46 4 **2392.** **β 748.** Discovered with the 6-inch on Mt. Hamilton in 1879. There is a small error in the place of this star in β (XI). The magnitude in SD is 8.6. The later measures are:

1891.85	131°1	1″25	2*n*	β	8.6...8.6
1898.73	134.7	1.36	1*n*	β	
1898.93	130.9	1.20	1*n*	Cg	8.0...8.5

[β (**XI**)...β^2...β (3114)...(*Pub. L. O.* **I, II**)...Cogshall (*A. J.* 478)...]

2393. **Σ 602.** Probably fixed. 46^m 4^s

1868.47	134°3	29″14	4*n*	Δ
1904.99	135.3	29.05	2*n*	β

[Ma (*F. S.* **II**)...H (**IV, V**)...Δ (**II**)...β^2...β^6...]

2394. **OΣ 88.** Without change. In 1865 Dembowski thought the principal star elongated, but this has not been confirmed, and Hussey found it round in 1899 with the 36-inch. 46 22

1870.76	301°8	0″64	6*n*	Δ
1898.76	304.0	0.67	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**II**)...Hu (*Pub. L. O.* **V**)...]

2395. **β 1237.** Discovered with the 36-inch. The only later measure is: 46 28

1898.11	58°0	4″52	2*n*	A

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...A (3584)...]

2396. **Σ 604.** Unchanged. 46 46

1865.73	38°4	2″14	3*n*	Δ
1879.01	40.5	2.30	1*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^2...Δ (**II**)...]

2397. **Hu 555.** (AC = **Σ 608.**) The principal star of Σ 608 was found to be a very close pair by Hussey at the Lick Observatory in 1902. No other measures. The Struve companion appears to be fixed, but there are no measures since Dembowski. 46 52

1866.50	115°5	4″13	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H^1...H (**V**)...Δ (**I, II**)...Hu (*Bul. L. O.* No. 27)...]

2398. **β 316.** Discovered with the 6-inch. There has been no change in twenty years. In β (VI) the R. A. is 10^m too great. It is 10′ *n* of *ω Eridani.* Some of the later measures are: 46 52

1887.90	179°4	1″10	4*n*	T
1888.15	178.6	1.01	3*n*	Hl
1888.66	179.2	1.14	3*n*	Lv
1902.11	179.6	1.01	1*n*	Do

[β (**VI**)...β (2062)... Δ (**I**)...Cin^4...Cin^5...Wilson (Cin^{10})... LM ... Lv^1...T (2899)...Hl (**I, II**)...Do (3378, 3799)...]

2400. **S 457.** The components are DM (−1°) 744 and 743. The only measures since South are: 46 59

1901.10	354°5	41″00	3*n*	β^5	8.3...8.3

2404. **Kr 25.** Noted as double in *A. G. Hels.* 47 27

[β (3042) (*Pub. L. O.* **II**)...]

$47^m 29^s$ **2405.** Σ 606. Without change.

1866.85	298°8	37″68	3*n*	Δ
1904.99	299.6	37.58	2*n*	β

[H (**IV, V**)...Δ (**II**)...β^2...β^6...]

47 41 **2406.** 7 *Camelopardali.* Δ 5. (AC = **Σ 610.**) The close pair was discovered by Dembowski in 1864. There is no change in the distant star C. The later measures of B indicate a change in the angle and distance. The following are all the observations:

1865.38	309°1	1″24	8*n*	Δ
1883.24	305.7	1.36	7*n*	En
1890.77	302.1	1.04	3*n*	β
1899.51	292.4	0.78	2*n*	A
1904.65	294.4	0.87	1*n*	A

The principal star has a proper motion of 0″022 in 302°7 (Auwers). There is no change in the Struve companion.

1865.25	239°2	25″66	3*n*	Δ

[Ma (*F. S.* **II**)...Ma (**XI, XIII**)... H (**V**)...Δ (1572)...Δ (**II**, p. 107)...Pk...Gl ...En (2663)...β (3048)(*Pub. L. O.* **II**)...A (3638)...]

47 46 **2407.** Σ 612. (= S 458.) The proper motion is 0″321 in the direction of 123°6 (Stumpe), and as there has been no relative change since the measures of Σ, both components have the same movement, and therefore probably form a physical system. H (VII) speaks of a third star in line *sp*, 20″ distant from B. That is probably this star:

1903.86	228°6	44″62	1*n*	β	...11.8

There is no change in the Struve star.

1867.62	198°2	16″65	4*n*	Δ
1894.05	198.3	16.33	2*n*	Eng
1903.85	198.7	16.47	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXVI**)...En...Δ (1204)...Δ (**I, II**)...Glasenapp (**II**)...Englehardt (**III**)...*Annals Toulouse Obsy.* **III**...β^6...]

48 0 **2410.** See 41. Discovered at the Lowell Observatory.

1899.92	123°9	9″02	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

48 2 **2411.** **H 3700.** The only other measures are:

1877.94	347°8	26″20	1*n*	β^1	
1902.87	347.4	26.50	2*n*	β^6	7.3...11.2

48 22 **2413.** Σ 595. No measures since 1867.

1867.48	133°9	3″83	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XII**)...Δ (**II**)...]

48 26 **2415.** OΣ 90. Error of 1^m R. A. in OΣ. Apparently fixed. With the 18½-inch I noticed a faint star *f*, about 20″ or 30″ distant (1877).

1868.64	345°8	1″86	5*n*	Δ
1898.51	343.8	1.98	3*n*	Hu

[Ma (**XIII**)... Ba (**I**)... Δ (**I**)... Sk^3... Maw (**I**)... Brown (3645)... Hu (*Pub. L. O.* **V**...]

$48^m 42^s$ **2416.** **H 3702.** "Nisi P. D. = 105° 21′." Found in the place given. There is nothing in −15°. In O. Arg. 8-9 m. The only measures are:

1836.96	221°0	20″99	2*n*	H^3	9 ...10
1903.96	227.4	17.81	2*n*	β^6	9.3...10.4

48 49 **2419.** **H 2241.** "Duplex" in O. Arg. The only measures are:

1900.66	263°1	11″59	3*n*	Es

[Espin (*Mon. Not.* **LXII**, 531)...]

48 56 **2420.** Σ 614. Unchanged.

1867.25	69°1	4″21	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Δ (**II**)...Cin^3...]

(See No. 13020)

49 12 **2421.** *Camelopardali* 54. **β 313.** The 6-inch seemed to show a small attendant to this star, the position of which was estimated, 250°: 10″: 6.5...11.5, with the note, "Companion excessively faint. There is a more distant one *sf*." There are no other observations except of a negative character. I could not find any pair of this kind in or near this place with the 36-inch. It was recently examined with the 40-inch (1898), but no near companion seen. It has two distant companions, 149°8: 40″3, and 179°0: 43″0. This star has a proper motion which is given:

Gr. 10-year Catalogue	0″119 in 134°3
Schroeter	0.153 in 133.3

[β (**VI**)...β (2062)...Doolittle (*A. J.* 547)...]

49 16 **2422.** **Ho 16.** The only measure of this is by Hussey, who found it independently:

1902.75	22°6	0″79	1*n*	Hu	8.8...13.0

[Ho (2778)...] (See p. 1065)

49 33 **2425.** **OΣ 89.** **B. A. C. 1510.** All of the attempted measures of this star are more or less uncertain, and, as it has always been single with the large telescopes, it is probably not double, but it should be examined occasionally under the best conditions.

The principal observations are:

1843.33	303°7	0″2	2*n*	Ma	
1848.28	305.9	0.45	5*n*	OΣ	
1869.02	104.2	Obl.	3*n*	Δ	
1873.35	152.8	0.48	1*n*	OΣ	"Uncertain"
1874.21	119.8	Oval	1*n*	Δ	
1876.08	Single		1*n*	Δ	
1878.70	126.7	0.3?	1*n*	Δ	
1894.26	Doubtful elongation		1*n*	Com	
1896 1900	Single, 36-in.			Hu, A	

[OΣ (**IX**)...Ma (**XI**)...Δ (**I**)...Big...Flm...Com (*Pub. Washburn Obsy.* **X**)... A (3465, 3584)...Hu (*Pub. L. O.* **V**)...]

$49^m\ 37^s$ **2426.** o^2 *Orionis.* **β** 553. Discovered with the 18½-inch. The proper motion of the principal star is 0″.097 in the direction of 241°.9 (Auwers). This accounts for the change shown in the measures, and it is therefore only an optical pair.

1892.01	48°.4	29″.97	3*n*	β
1898.75	49.1	30.57	2*n*	β

[β (**X**)...β1...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

49 50 **2427.** **β** 404. Discovered with the 6-inch. Without motion.

1888.69	291°.6	1″.52	3*n*	Lv
1891.82	109.6	1.94	2*n*	Collins
1898.72	111.4	1.72	2*n*	Hu

[β (**VII**)...β (2103)...Δ (I)...Lv^1...Collins (*Proc. Haverford Coll. Obsy.* 1891) ...Hu (*Bul. L. O.* No. 44)...]

49 57 **2428.** **OΣ** 91. Nearly all observers since **OΣ** have reversed the angle. Apparently fixed.

1868.00	240°.2	0″.75	4*n*	Δ	7.5...8.0
1891.01	240.8	0.58	2*n*	Hl	
1898.29	237.2	0.66	3*n*	Hu	

[OΣ (**IX**)... Da^3... Se... Hl (**I, II**)... Δ (I)... Cin^5... Cin^6... Wilson (Cin^{10})... Lv^1...Sk^3...O. Stone (2201)...Hu (*Pub. L. O.* **V**)...]

50 12 **2430.** **Σ** 613. The distance of B has diminished, and as B and C are relatively fixed, the change is probably due to the proper motion of A.

A and B

1830.92	106°.5	19″.83	3*n*	Σ
1867.09	105.9	18.15	3*n*	Δ
1897.19	104.2	16.58	2*n*	A
1903.84	104.3	16.40	2*n*	β

B and C

1831.77	18°.8	15″.83	2*n*	Σ
1867.68	18.5	15.65	1*n*	Δ
1897.19	13.8	16.08	2*n*	A
1903.84	16.3	15.76	2*n*	β

[Ma (*F. S.* **II**)...Ma (**XIII**)...Δ (1735)...Δ (**II**)... Flm... Gl ... A (3465)... Espin (*Mon. Not.* **LXII**, 528)...β^6...]

50 16 **2431.** **A** 115. Discovered at the Lick Observatory by Aitken (3741)(*Bul. L. O.* No. 3).

50 30 **2432.** 62 *Eridani.* **Sh** 48. (= **H** **VI.** 106 = σ 142.) *White: blue.* The large star has a proper motion of 0″.018 in 306°.4 (Auwers). The companion is the 9.0 m star, SD (5°) 1093. The only later measures are:

1897.90	74°.7	66″.51	5*n*	Doo

[Doolittle (*Pub. Flower Obsy.* I)...]

50 32 **2433.** 99 *Tauri.* **β** 1045. Discovered with the 36-inch. Auwers gives this star a small proper motion, 0″.021 in the direction of 238°.4. Further observations are necessary to show whether or not the companion has this movement. The later measures are:

1891.84	5°.6	6″.21	3*n*	β
1898.96	6.4	6.19	1*n*	β

[β (**XV**)...β (2929, 3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

2435. ω *Aurigae.* **Σ** 616. (= **H** **II.** 14 = **Sh** 47.) Called only 4 *Aurigae* in the star catalogues. Modern measures slightly increase the angle, and diminish the distance. The principal star is given a proper motion of 0″.099 in 178°.6 (Auwers), and the companion has the same movement. $51^m\ 6^s$

1868.99	354°.8	6″.16	5*n*	OΣ
1870.74	353.4	6.03	6*n*	Δ
1884.01	354.0	6.10	3*n*	Per
1889.07	352.8	6.01	5*n*	Giacomelli

[Ma (**X, XI, XIII, XV**)...Ma (304)...Ma (*F. S.* **I**)...H^1...Wr...Ra (**XXIII**)... Δ (1185)...Δ (**I, II**)...Se...Wr (*Phil. Trans.* 1851)...Pk...Sp (**II**)...Per ...Per (2684)... OΣ (**IX**)... Giacomelli (I)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)...]

2438. **H** 3705. The later measures show no motion. 51 24

1880.37	141°.0	22″.29	3*n*	β^3	7.6... 9.7
1901.78	141.2	22.38	2*n*	β^5	7.7...10.5

2439. **Σ** 620. (= **H** 3264.) The angle in Struve must be too small, as the measures since show no change whatever. 51 32

1843.58	229°.7	3″.76	2*n*	Ma
1853.15	233.0	3.75	1*n*	Ma
1866.92	233.3	3.71	3*n*	Δ
1889.66	232.2	3.94	3*n*	HΣ
1896.16	231.2	3.64	3*n*	A

[Ma (*F. S.* I) ..Ma (**XI, XII, XIII, XV**)...WS...WS^2...Gl...Flm...Δ (**II**)... Δ (2194)...A (3395)...*A. G. Leipzig*, p. 207...HΣ (**XII**)...]

2441. **Ho** 17. The only later measures are: 51 39

1896.52	55°.7	3″.91	2*n*	Ho	7.5...10.0

[Ho (2778, 3558)...]

(See p. 1065)

2442. **Σ** 624. (= **H** 30.) Fixed. 51 44

1867.36	88°.8	28″.57	3*n*	Δ

[Ma (*F. S.* **II**)...En...Δ (**II**)...]

2443. **Σ** 622. (= **H** **I.** 68 = **S** 460.) There is slow motion in angle, but the distance remains constant. 51 52

1783.06	185°.1	....	1*n*	H
1846.02	176.8	2″.78	3*n*	OΣ
1866.90	174.0	2.44	3*n*	Δ
1880.59	174.1	2.44	2*n*	β
1888.13	173.9	2.47	3*n*	Hl
1892.85	171.6	2.40	2*n*	Jones
1902.97	172.1	2.46	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XV**)... H^1... Bp ... Ra (**XXIII**)?... J^2...Da^3...Se ...Se^3...OΣ (**IX**)...Δ (1204)...Δ (**I, II**)...Flm...WS...Hl (*Wash. Obsns.* 1880)...Hl (**II**)...Sp (**II**)...T (2991)...Sk^3...Jones (*Proc. Haverford Coll. Obsy.* 1891, 1892)...Glasenapp (**II**)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Do (2316, 3930)...]

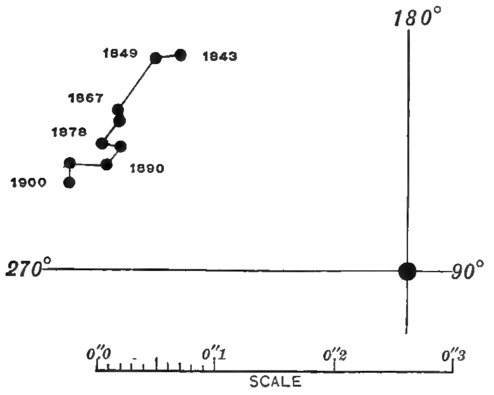
$51^{m}\ 53^{s}$ **2444.** **Ho 222.** Discovered at the Dearborn Observatory.

1899.12	223°.6	2″.25	2*n*	A	7.2...9.9

[Ho (2977)...A (3638)...]

(See p. 1065)

52 3 **2445.** 5 *Aurigae.* **OΣ 92.** Probably a physical pair, but the motion is practically rectilinear, and the change principally in angle. The large star has a proper motion of 0″.032 in 295°.7 (Auwers).



5 Aurigae. OΣ 92

1843.26	226°.6	2″.66	2*n*	Ma
1849.09	230.1	2.78	3*n*	OΣ
1867.39	241.1	2.80	3*n*	Δ
1872.01	242.9	2.75	3*n*	Δ
1878.04	247.4	2.78	1*n*	β
1883.28	246.8	2.64	4*n*	En
1890.99	250.7	2.69	2*n*	Hl
1898.36	252.6	3.02	3*n*	Hu
1900.00	255.7	2.97	3*n*	Doo
1903.23	253.0	2.99	1*n*	Lewis

[Ma (**XI, XIII**)...Da^3...OΣ (**IX**)...Hl (**I, II**)...Pl...Sk^2...Flm...Do (2322)... En (2678)....Δ (**I**)....β^1....Lewis (*Mon. Not.* **LIV**, 314: **LXIV**, 792)....Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Sk^5...Doolittle (*A. J.* 547)...]

52 5 **2446.** **Σ 619.** The change is probably due to proper motion.

1859.27	111°.5	5″.35	1*n*	Ma
1868.08	115.3	5.03	4*n*	Δ
1896.07	121.2	5.06	2*n*	Collins
1897.83	121.2	4.55	3*n*	A

[Ma (*F. S.* **I**) ... Ma (**XIII, XV**) ... Δ (1800) ... Δ (**II**) ... Flm ... Sk^2... Sk^5... Collins (*A. J.* 378)...A (3465, 3638)...Espin (*Mon. Not.* **LXII**, 528)...]

52 8 **2447.** *Eridani* 387. **H 689.** Lalande 9355 (6½ m). Apparently fixed.

1880.63	275°.6	20″.67	2*n*	β	6.9...11.4
1901.76	278.4	20.97	2*n*	β	

[β3...A (*Bul. L. O.* No. 11)...β^5...]

2448. *Orionis* 26. **Sh 49.** (= **H** V. 113 = **H** V. 57 = σ 144 = OΣ (App) 58.) B. A. C. 1537. Probably without change. (See No. 2461.) $52^{m}\ 11^{s}$

A and B

1783.76	303°.9	37″.88	1*n*	H	
1874.44	304.9	39.22	2*n*	Δ	5.2...6.7
1880.57	304.9	39.11	2*n*	β	
1903.85	305.0	39.11	2*n*	β	

A and C

1874.44	88°.4	54″.68	2*n*	Δ	...9.0
1880.38	87.9	54.37	3*n*	β	...8.9
1903.85	88.7	54.01	2*n*	β	...9.1

[Δ (**I**)...β^3...*A. G. Leipzig*, p. 207...Coleman (*Mem. R. A. S.* **LIV**)...β^6...]

2449. **Σ 617.** Fixed. 52 16

1866.85	120°.6	12″.47	3*n*	Δ
1904.05	122.5	12.76	3*n*	Es

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Espin (*Brit. Ast. Ass'n* **III**, 227) (*Mon. Not.* **LXIV**, 676)...]

2450. **H 2244.** "Both stars remarkably *red.*" B = Rad^1. 1357; magnitudes, 8.0...8.9. The only observation since Herschel is: 52 16

1904.34	164°.4	106″.81	3*n*	Miller	8.0...8.5

2451. **Σ 618.** (= **OΣ (App) 56.**) The proper motions of these stars is given by Porter: 52 18

A = 0″.317 in 15°.3
B = 0.291 in 23.4

As they have been relatively fixed for sixty years, they must have exactly the same proper motion.

1831.96	211°.5	32″.22	3*n*	Σ
1866.18	211.2	32.54	3*n*	Δ
1883.49	211.2	32.75	4*n*	Franz
1891.30	211.8	32.60	2*n*	Eng
1904.73	211.3	32.51	2*n*	β

[Ma (*F. S.* **I**)....Bl (V)....Δ (**II**)....Franz (2649)....Engelhardt (**III**)....Espin (*Mon. Not.* **LXIV**, 676)...β^6...]

2452. *Aurigae* 28. **Σ 623.** Unchanged. The principal star has a proper motion of 0″.036 in 177°.9 (Battermann). 52 25

1867.28	204°.8	20″.48	4*n*	Δ
1893.03	204.4	20.48	2*n*	Gla

[Ma (*F. S.* **II**)...Δ (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

2453. **A. G. 83.** Double in *A. G. Lund.* Measures by β^6. 52 33

2454. **A. G. 84.** Double in *A. G. Harvard.* Measures by Espin (*Mon. Not.* LXII, 531). 52 42

$52^m\ 45^s$ **2455.** **β** *Camelopardali.* **S** 459. (= **H** **VI.** 36 = σ 141 = **OΣ (App)** 57.) No measures in H. The smaller star is DM (60°) 855. The proper motion of A is insensible, 0″014 in 270°0 (Auwers).

1875.14	208°2	80″26	2*n*	Δ
1883.40	208.2	80.47	4*n*	Franz
1903.74	208.2	80.95	3*n*	β

Espin notes 11.5 m star near B (= Espin 58).

B and C

1892.98	167°4	14″81	2*n*	Es
1903.74	169.2	14.81	3*n*	β

[Δ (**I**)....Franz (2649)....Espin (*A. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n*, **III**, 227)(*A. N.* 3784)...β6...]

53 5 **2456.** **Σ** 626 *rej.* The only recent observation is the following:

1903.21	239°7	23″91	2*n*	Miller	8.5...11.0

53 10 **2457.** **Σ** 615. Some change is probable. The distance of Ma must be erroneous.

1844.33	337°8	0″8	1*n*	Ma
1866.81	346.0	1.40	3*n*	Δ
1873.35	346.9	1.41	1*n*	OΣ

[Ma (*F. S.* **I**)..Ma (**XI**)...H (**V**)...Flm...Δ (1800)...Δ (**II**)...OΣ (**IX**)...Do (2989)(*Trans. R. I. Acad.* **XXIX**, Part 13)...]

53 20 **2458.** **Σ** 621. Without change.

1867.75	131°5	9″80	3*n*	Δ
1893.03	132.0	9.68	2*n*	Gla

[Ma (*F. S.* **II**)...Ma (**XIII**)...Δ (**II**)...Glasenapp (**II**)...]

53 22 **2459.** ε *Aurigae.* **β** 554. These minute stars were noted with the 18½-inch. The proper motion is very small, 0″022 in the direction of 231°1 (Bonn). The same catalogue gives the principal star as variable, 3.0 to 4.5 m. Ball in his parallax measures (*Dunsink Obsns.* IV) used a star 207″6 distant in the direction of 47°3. Later measures of the small stars are:

A and B

1891.86	224°8	29″30	2*n*	β
1898.79	223.8	29.93	1*n*	β

A and C

1891.86	275°0	43″03	2*n*	β
1898.79	275.0	43.03	1*n*	β

A and D

1891.86	317°0	46″29	2*n*	β
1898.79	317.3	46.21	1*n*	β

The large star is a spectroscopic binary, discovered by Vogel.

[β (**X**)...β1...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

53 39 **2460.** *Leporis* 3. **β** 314. Discovered with the 6-inch. In Heis and Argelander 6 m, but placed in *Eridanus.* Gould gives it in *Lepus* 6 m. Lalande 9420. In all but one measure Δ rates the components of equal magnitude. The change, if any, is in the distance. At the time of discovery the distance was estimated 0″5.

A and B

1889.13	326°9	1″05	3*n*	β
1890.40	321.6	0.82	2*n*	Sp
1898.11	326.2	0.86	1*n*	Brown
1898.16	329.2	0.98	1*n*	See

AB and C

1898.16	30°6	54″83	1*n*	See
1899.09	31.1	54.22	1*n*	β

[β (**VI**)...β (2062, 2929) (*Pub. L. O.* II)...Δ (I)...Cin5...Cin6...Sp (**III**)... See ( )...Brown (3645)...]

2461. **H** **V.** 57. (= σ 148.) In *Pos. Med.* the place is $4^h\ 54^m\ 31^s$; 13° 57′. There is no such object in either of these places. This is the same as H V. 113 (see No. 2448). The distance of C probably belongs to B. $53^m\ 42^s$

2462. **β** 1238. Discovered with the 36-inch. It is 25^s *p* and 9′ *s* of the wide pair, South 461. 53 53

1899.66	12°4	1″52	2*n*	A
1900.91	6.5	1.30	2*n*	Doo

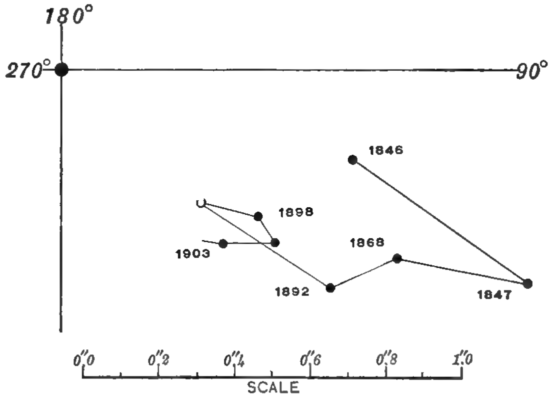
[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3638)...Doolittle (*A. J.* 547)...]

2463. **β** 315. Discovered with the 6-inch. Unchanged. 53 54

1891.86	226°0	10″67	2*n*	β	8.7...9.4

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Δ (I)...] (See p. 1065)

2464. **OΣ** 93. Retrograde motion, and probably binary, but the measures are very discordant. 54 7



OΣ 93

1846.12	72°9	0″82	1*n*	Ma
1847.18	65.6	1.37	2*n*	OΣ
1868.19	60.9	1.03	3*n*	Δ
1892.00	51.4	0.93	2*n*	Collins
1894.10	47.0	0.5±	1*n*	HΣ
1898.49	53.5	0.66	5*n*	Hu
1900.16	51.3	0.74	1*n*	Bryant
1903.99	43.4	0.64	1*n*	Bowyer

[Ma (**XIII**)...OΣ (**IX**)...Do (2322)...Flm...Δ (I)...Sk3...Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1891, 1892)....Brown (3645)....HΣ (**XII**).... Bryant and Bowyer (*Mon. Not.* **LXI**, 486; **LXIV**, 792)...Hu (*Pub. L. O.* **V**)...]

54^m 8^s **2465.** **Σ 625.** (= **♅ II. 53.**) Probably fixed, but no late measures.

1783.33	108°5	....	1*n*	♅
1852.27	114.0	4″33	1*n*	Ma
1867.07	114.5	4.57	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XIII**)...Δ (**II**)...] (See No. 13025)

54 9 **2466.** **Ⅎ 6.** (= **β 187** *rej.* = **Ku 20.**) Discovered by Dembowski in 1873. No material change.

1901.09	89°8	1″10	2*n*	Ku	9.1...9.3

[Δ (1979)...Δ (I)...β (*Mon. Not.* **XXXV**, 382)...Kustner (3821)...]

54 16 **2467.** **Σ 627.** (= **S 462**) Probably unchanged.

1866.21	259°6	21″03	4*n*	Δ
1893.11	258.7	20.72	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Ra (**XXVI**) ... Flm ... Δ (**II**) ... Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...]

54 18 **2468.** *Tauri* 323. **S 461.** (= **Σ 12, App. I = OΣ** (**App** 59.) W^2 IV. 1192 and 1196. The larger star is given a proper motion of 0″033 in 335°9 (Battermann), which evidently belongs to B as well.

1833.42	158°6	78″79	5*n*	Σ	6.0...7.0
1869.62	158.9	79.10	6*n*	Δ	6.1...7.2
1878.54	158.9	78.87	5*n*	Je	
1892.64	158.9	78.75	4*n*	Franz	

[Se^1...Ra (**XXVIII**)...Δ (**II**) ..Je (2329)...Glasenapp (**II**)...Franz (3464)...]

55 8 **2474.** **S 463.** (= **H 5463.**) Magnitudes in H, 8...9. The later measures indicate a little change in distance.

1839.94	28°8	32″70	1*n*	OΣ	7.8...10.0
1881.22	29.9	32.33	3*n*	Doubiago	
1904.03	29.2	32.15	3*n*	β	7.1... 9.4

[OΣ (**X**)...β^6...]

55 9 **2475.** **Σ 631.** Without change.

1867.92	105°6	5″47	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XII, XV**)...H (**VIII**)...Se...Cin^4...Cin^5...Δ (**II**)...]

55 22: **2476.** **H 1152.** R. A. 21^s less in H (V). Probably this is the 9.4 m star, DM (68°) 364.

55 43 **2480.** 11 **and** 12 *Camelopardali.* **Σ 13, App. I.** Very little if any change. A nearer star in Bl (V). The proper motions are given in *A. G. Hels.*.

A = 0″015 in 215°5
B = 0.012 in 194.5

1869.28	7°5	180″81	5*n*	Δ
1879.06	7.7	181.19	5*n*	Je
1904.99	8.0	180.32	2*n*	β

[Ra (**XXVIII**)...Pk...Δ (**II**)...Bl (**V**)...Je (2329)...Glasenapp (**I, III**)...β^6...]

55^m 47^s **2481.** **Σ 630.** (= **♅ III. 52 = S 465.**) Fixed. Decl. in ♅ 28′ too large.

1865.25	48°6	14″11	3*n*	Δ
1888.49	48.5	14.04	4*n*	Toulouse

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIII**)...Se^1...Se^2...Hd...Δ (**II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...*Annals Toulouse Obsy.* **III**...]

56 4 **2482.** **A. G. 85.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

56 5 **2483.** **Weisse 5.** Marked "duplex" in W^1. The only measures are:

1893.97	82°2	4″59	1*n*	Leip	9.2...9.5
1900.75	83.5	4.38	2*n*	β	9.0...9.0

[*A. G. Leipzig*, p. 207...β^5...]

56 6 **2484.** **A. G. 86.** Double in *A. G. Lund.* Measures by β^6.

56 17 **2485.** **See 44.** The only other measures are:

1899.73	333°2	1″48	3*n*	Cg	7.0...11.3

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

56 21 **2486.** **A. G. 87.** Double in *A. G. Albany;* distance estimated 5″. Measures by Miller (*A. J.* 554).

56 51 **2488.** **H 2247.** "A third star, pos. 10° or 15° by diagram." The 40-inch shows a close companion to C.

AB	1901.77	57°0	20″79	2*n*	β^5	8.5...11.9
AC	1901.77	17.9	33.30	2*n*	β^5	
CD	1901.77	314.3	2.96	2*n*	β^5	11.6...13.0

57 7 **2489.** **H 690.** This is DM (28°) 740.

1904.77	277°6	13″43	2*n*	β^6	9.8...11.9

57 8 **2490.** **Weisse 6.** "Duplex" in W^2 Looked for in 1904, but no double star found. This star has no companion.

57 13 **2492.** **A. G. 88.** Double in *A. G. Leiden.* Measures by β^6

57 17 **2494.** **Σ 636.** Without change.

1867.29	103°5	3″54	3*n*	Δ
1886.72	100.1	3.93	1*n*	LM

[Ma (*F. S.* I)...Ma (**XI, XIII**)... H^1...Se... En (1673)...Δ (**II**)...Cin^4... Cin^5 ...Lv^1...LM...]

57 17 **2495.** 9 *Aurigae.* **β 1046.** (AC = **♅ VI. 35.**) The faint star, B, was detected with the 36-inch. The principal star has a considerable proper motion:

Auwers	0″169 in 190°5
A. G. Harvard	0.146 in 192.9

It is practically certain that the new star is moving with A, as otherwise the position-angle would be 14° less in 1898 than at the date of the first measures.

A and B

1898.79	92°0	6″38	1*n*	β

A and C (= H VI. 35)

1888.19	61°0	90″10	2*n*	Eng
1888.92	60.8	89.92	2*n*	β
1898.79	60.9	89.85	1*n*	β

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...Engelhardt (**II**)...]

57^m 22^s **2496.** **β 884.** Discovered with the 18½-inch. The measures furnish no evidence of motion. Later measures are:

1891.15	20°7	0″6±	3*n*	Sp
1892.04	20.7	0.54	3*n*	β
1896.11	21.1	0.6±	4*n*	Sp

[β (**XIII**)...β^3...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)...]

(See p. 1065)

57 37 **2497.** **β 749.** Discovered with the 6-inch on Mt. Hamilton in 1879. The only later measure is:

1891.86	228°9	1″11	2*n*	β

[β (**XI**)...β^2...β (3114)(*Pub. L. O.* **I, II**)...]

(See p. 1065)

58 **2501.** **G. Anderson 1.** Discovered by G. Anderson with Washington 26-inch. Measures by Hl (I). Place approximate.

58 0 **2502.** **Σ 639.** Unchanged.

1867.34	79°7	5″33	3*n*	Δ
1878.00	79.3	5.35	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^1...Cin^5...]

58 2 **2503.** **Σ 635.** Change doubtful. Late measures are needed.

1842.33	277°9	0″72	2*n*	Ma
1847.26	285.5	0.63	2*n*	OΣ
1867.76	284.4	0.64	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**X**)...OΣ (**IX**)...Δ (**II**)...]

58 7 **2504.** **OΣ 94** *rej.* Magnitudes from Poulkowa catalogue of 1843. Too faint to measure by Δ. A is 8 m in O. Arg. The only measures since Ma are:

AB	1899.31	304°4	17″94	3*n*	Hu
	1900.75	304.1	18.03	2*n*	β
AC	1899.31	63.8	25.39	3*n*	Hu
	1900.75	63.1	25.04	2*n*	β

The 40-inch shows a 14 m star from A, 340°9: 26″1.

[Ma (**XI**)...Δ (**I, p. 227**)...Hu (*Pub. L. O.* **V**)...β^5...]

58 23 **2506.** **OΣ 97.** This was noted as oblong 1842.93 by OΣ, single 1844.91, and elongated 1846.19. It was measured in 1848, 1849, 1851, and 1861 on 4*n*, the mean of which is given here. These measures show no change in either angle or distance. Ma found, 76°7: 0″3 (1843.23) 1*n*. Δ found it doubtful 1866.08 and single 1869.75. I could not be certain of any elongation 1873.9 with the 6-inch, and it was certainly single with the 36-inch 1891.11. Hussey could not see any elongation with the same instrument in 1898.99. The place here given is that of the only star near, but it is much smaller than that described by OΣ. If that is the double star, there is an error of about 1^m R. A. in OΣ. The star whose place is given is 7.5 m in DM, and 8 in W^2, and so I found it. The discrepancy in magnitude and place suggests some other star, perhaps in quite a different place, as the one observed by OΣ. It will be noticed that the magnitudes, distance, and angle (+180°) all describe OΣ 95.

[Ma (**XI**)...OΣ (**IX**)...Δ (**I, p. 227**)...β (3114)(*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

2507. **H. C. Wilson 1.** Discovered by Wilson at the Cincinnati Observatory. Only approximate place in Cin^{10}. Identified and measured: 58^m 25^s

1902.93	83°8	8″90	2*n*	β^6	9.4...9.7

2509. **OΣ 95.** **B. A. C. 1563.** There is some change in angle and distance. The components appear to have a small common proper motion. 58 28

1868.49	337°4	0″58	4*n*	Δ
1877.84	333.1	0.82	3*n*	Sp
1884.06	336.9	0.87	5*n*	Per
1890.15	331.5	0.90	3*n*	T
1898.19	326.6	0.83	3*n*	Hu
1904.11	325.0	0.80	2*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hl (**I, II**)...Sp (**II**)...Per...Per (2684, 2749)...Flm...β^2...Do (2322)...T (3186)...Sk^3...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)....Solá (3563)....HΣ (**XII**)....Hu (*Pub. L. O.* **V**)....Biesbroeck...]

2511. **Σ 640.** (− **H** 356.) C not measured by Σ. No change in AB. 59 11

1867.57	96°9	9″37	4*n*	Δ
1900.74	96.6	9.48	2*n*	β

The only measure of AC is:

1900.74	316°3	25″28	2*n*	β	...11.0

[Δ (**II**)...Ma (*F. S.* **I**)...β^5...]

2513. **Σ 633.** Unchanged. 59 20

1866.26	341°8	12″26	3*n*	Δ
1904.98	341.3	12.14	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Bl (**V**)...Δ (**II**)...β^6...]

2514. **H. C. Wilson 2.** This is a distant companion (212°2 : 94″7) to the 7.2 m star, SD (20°) 1003, the place of which is given. The Decl. in Cin^{10} is nearly half a degree too large. 59 39

1902.88	186°3	8″73	2*n*	β	10.0...11.2

[Wilson (Cin^{10})...β^6...]

59m 55s **2515.** H 3265. "A third near; in Cluster VIII, 61."

59 56 **2516.** OΣ 96 *rej.* From Poulkowa catalogue of 1843. No measures in OΣ, and not seen by Δ in 1866 and 1868. Ma gives angle only, 107°3 (1843.27) 1*n*. Companion faint, but readily seen with the 6-inch in 1874. The angle by Doolittle requires a correction of 180°.

1899.08	104°8	21″25	3*n*	Hu	6.5...11.0

[Ma (**XI**).... Δ (**I**, p. 227).... Hu (*Pub. L. O.* **V**).... Doolittle (*Pub. Flower Obsy.* **I**)...]

0 2 **2518.** A. G. 89. Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554).

0 5 **2521.** γ *Caeli.* β 750. Discovered with the 6-inch on Mt. Hamilton in 1879, but it had been previously found by Jacob. The components are relatively fixed. The large star has a proper motion of 0″123 in 125°7 (Innes), and the small star is evidently moving with it.

Some of the earlier and later measures are:

1853.50	315°7	2″82	5*n*	Jacob
1882.19	318.4	2.23	2*n*	Russell
1891.08	311.2	3.12	1*n*	Sellors
1894.08	307.7	2.34	1*n*	Sellors
1897.09	313.4	3.17	2*n*	See

[Jacob (*Madras Obsns.* 1848-52) ... Powell (*Mem. R. A. S.* **XXV**) ... β (**XI**) ... β2 ... β (3114) (*Pub. L. O.* **I, II**) ... Russell (*Syd. Obsns.* 1871-81) ... Sellors (3154, 3303) ... See (3495) ...]

(See p. 1065)

0 11 **2524.** Σ 637. No material change.

1866.90	24°7	20″17	3*n*	Δ
1904.84	27.1	19.97	1*n*	β

[H (IV)...Ma (*F. S.* **II**)...Δ (**II**)...β6...]

0 26 **2527.** H 2252. This is in the field *p* the 9m star, SD (9°) 1075. The only measures are:

1902.82	148°5	8″14	2*n*	β6	10.0...10.2

0 45 **2528.** 105 *Tauri.* S 466. (= Ħ VI. 105 = σ 155.) The principal star has a proper motion of 0″025 in 276°8 (*A. G. Berlin*). The only measures since South are:

1900.74	250°5	111″37	2*n*	β5

0 48 **2530.** 66 *Eridani.* Σ 642 *rej.* The following are all the measures:

1879.95	9°0	52″50	2*n*	β3	
1900.77	9.6	52.81	2*n*	β5	6.0...9.7

0 48 **2531.** 103 *Tauri.* Edgecomb. (AC = Ħ V. 114 = σ 153.) The faint attendant, B, was discovered by Edgecomb with 9.4-inch in 1878. The only prior measure of C is, Ħ 197°6: 30″05 (1783.80) 1*n*. The bright star is given a proper motion of 0″012 in 270 (*A. G. Berlin*).

AB	1900.74	149°6	13″30	2*n*	β
AC	1900.74	197.7	35.51	2*n*	β

[β3...β5...]

2532. Σ 638. Fixed. A star 10m *sf*, H (IV). 1m 6s

1868.16	221°2	5″28	4*n*	Δ
1904.83	221.8	5.24	2*n*	β

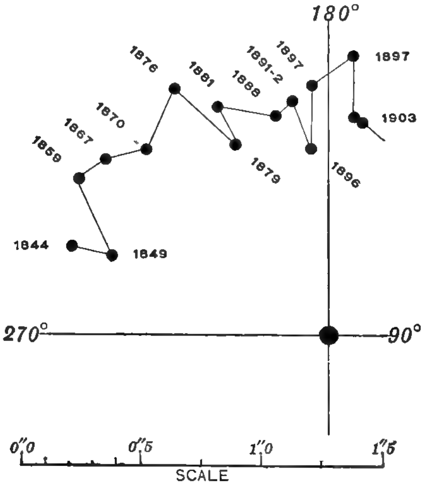
[H (**IV, V**)...Ma (*F. S.* **I**)...Ma (**XIII**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...β6...]

2534. β 751. Discovered with the 6-inch on Mt. Hamilton in 1879. Without change. 1 16

1898.87	255°9	3″48	1*n*	Hu
1898.97	257.0	3.25	2*n*	β

(β (**XI**)...β2...β (3114) (*Pub. L. O.* **I, II**) (*Pub. Y. O.* **I**) ... Hu (*Bul. L. O.* No. 44)...]

2535. 14 *Orionis.* OΣ 98. Binary. The motion thus far is principally in angle. Gore from the measures to 1887 finds a period of 190.48 years, but the arc is too small for any definite result. It will probably require the measures of at least another half century. This star has a proper motion of 0″050 in 157°3 (Auwers). 1 21



14 Orionis. OΣ98

The motion to this time will be seen from the following selected epochs:

1844.53	250°8	1″14	3*n*	OΣ
1849.22	249.6	0.98	2*n*	OΣ
1859.22	237.8	1.24	2*n*	OΣ
1867.02	231.5	1.19	3*n*	Δ
1870.87	224.1	1.09	3*n*	OΣ
1876.18	211.9	1.22	2*n*	Du
1879.10	205.8	0.89	2*n*	Hl
1881.16	205.9	1.08	4*n*	Je
1888.10	193.3	0.95	6*n*	Sp

1891.05	188°6	1″00	3*n*	Hl
1892.87	188.6	0.99	2*n*	Jones
1896.26	185.2	0.78	3*n*	Com
1897.88	183.7	1.05	3*n*	Hu
1897.97	174.6	1.18	3*n*	A
1900.84	173.1	0.92	4*n*	Do
1903.65	170.3	0.90	7*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (IX)(X, p. 191)...Δ (2193)...Δ (I)...Da^3...Sp (2193)...Sp (**II**)(**II** App)...Flm...Hl (I, II)...Hl (*Wash. Obsns.* 1881)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Gore (*Mon. Not.* **XLVII**, 266) (*Observatory*, **XIV**, 413) (*Trans. R. I. Acad.* 3d series, **I**)...Lv^1...En (2678)...T (2866)...Pl...Kustner (2584)...Big...Jones (*Proc. Haverford Coll. Obsy.* 1891–92)...Perry (*Eng. Mech.* **XXXIX**, 11) ... Sk^3 ... Maw (**I, IV**) ... Je (2345, 2449)...Du ... Glasenapp (**II**) ... Big (*Bul. Ast.* **XII**, 299) ... Com (*Pub. Washburn Obsy.* **X**) ... Do (2989, 3378, 3680, 3799) ... A (*A. J.* 429) ... Knorre (3518)...Maw (**III**)... Solá (3563) ... Hu (*Pub. L. O.* **V**) (*A. J.* 427)... Gl (*Mon. Not.* **LXI**, 556).... HΣ (**XII**)....Biesbroeck....Greenwich Observatory (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 497; **LXI**, 486; **LXIII**, 403; **LXIV**, 792)...]

(See p. 1065)

$1^m 23^s$ **2536.** **Σ 643.** Probably unchanged.

1867.26	299°0	2″81	3*n*	Δ
1893.04	300.0	2.73	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**VII**) ... Se... Δ (**II**)...Glasenapp (**II**)...*A. G. Leipzig*, p. 246...]

1 37 **2537.** **H 3723.** The angle is measured in Cin^3, 63°8 (1875.61).

2 4 **2541.** **Σ 632.** The only measures are:

1848.23	45°7	2″40	1*n*	Ma
1868.65	42.9	2.14	4*n*	Δ
1904.89	45.5	2.21	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Ma (**XIII**)...β^6...]

2 5 **2542.** **OΣ (App) 61.** Probably unchanged:

1893.79	243°6	68″68	4*n*	Franz
1902.90	244.0	68.64	4*n*	β

[Δ (**II**)...Franz (3464)...β^6...]

2 11 **2543.** **Σ 644.** (= **♅ I. 45.**) Without change.

1869.09	220°9	1″58	5*n*	Δ
1903.20	221.9	1.57	3*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**XIII, XV**) ... H^1... Da^2... Se^1... OΣ (**IX**)... Δ (1118)...Δ (I, **II**)... Du...WS...WS^2...Do (2196, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Je (2329, 2345)... Bl (**V**)... Sk^3...Gl...Sp (**II**)...Seagrave (*Sid. Mess.* **II**, 274)....T (2991)....Jones (*Proc. Haverford Coll. Obsy.* 1892)....Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Knorre (3300)...Ebell (3321)...Biesbroeck...]

2 13 **2544.** *Aurigae* 47. **β 1047.** (AB = **Σ 645 = ♅ III. 90.**) The duplicity of the smaller component of Σ 645 was discovered with the 36-inch. The wide pair was first observed by Herschel in 1782. The principal star is Lalande 9653.

The close pair may be in rapid motion. The following are all the measures:

B and C

1889.09	75°3	0″44	3*n*	β
1890.78	58.2	0.24±	6*n*	Sp
1892.12	68.3	0.26	3*n*	β
1896.11	50.3	0.21	1*n*	Lewis
1900.20	54.4	0.39	3*n*	Lewis
1900.87	46.3	0.30	1*n*	Doo
1904.18	57.8	0.3±	1*n*	Biesbroeck

There is no change in the wide pair.

A and BC (= Σ 645)

1866.14	27°0	11″79	3*n*	Δ
1889.09	26.6	11.69	3*n*	β
1890.78	27.3	11.82	6*n*	Sp
1892.11	27.4	11.75	3*n*	β

[β (**XV**)....β (2929, 3141) (*Pub. L. O.* **II**).... Sp (**III**).... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486; **LXII**, 383; **LXIV**, 792) .... Doolittle (*A. J.* 547)....Biesbroeck...]

The following references include all the measures of the wide pair:

[Herschel (*Mem. R. A. S.* **XXXV, XXXVIII**)...Ma (*F. S.* **I**)...Se...Ra (**XXIV**)...Δ (1204)...Δ (I, **II**)...Glasenapp (**II**)...]

2545. **See 46.** The angle by See of 357°8 seems to be incorrect. Probably no change. The distances by Cogshall are discordant. $2^m 14^s$

1899.78	14°9	11″91	3*n*	Cg	
1903.44	14.9	14.47	2*n*	β	8.5...12.0

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...β^6...]

2546. **Σ 649.** (= **♅ IV. 43 = ♅ N. 46 = Sh 50.**) *White: very ruddy*, H. There may be a little change in the angle, but probably only a perspective pair. 2 35

1809.04	83°3	.....	1*n*	♅
1863.11	78.6	21″71	5*n*	En
1866.97	78.8	21.15	3*n*	Δ
1888.08	76.8	21.71	2*n*	T
1904.80	74.9	21.24	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XV**)...H (**VIII**)...En...Δ (**II**)...T (2991)...β^6...]

2547. **Σ 646.** Fixed. 2 46

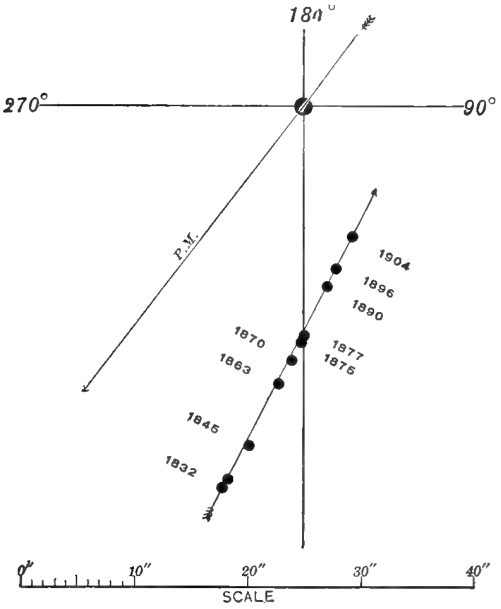
1867.09	73°5	15″61	3*n*	Δ
1904.83	73.7	15.72	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XII, XIII**)...Gl...WS...WS^2...Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...β^6...]

2548. *Camelopardali* 19 (Hev.). **Σ 634.** (= **S 464 = OΣ (App) 60.**) The large relative change is due to proper motion. The motion of the principal star is 0″179 in the direction of 323°6, while the companion has a proper motion of about 0″165 in nearly the opposite direction. The minimum distance of a little more than 9″ will be reached about 1928, and then the distance will begin to increase until finally they will be too widely separated to be considered as a double star. 2 47

The following measures are shown on the accompanying diagram:

1832.10	348°2	34″53	3*n*	Σ
1836.21	348.9	33.55	3*n*	Σ
1845.35	351.3	30.24	2*n*	Ma
1863.15	355.4	24.62	5*n*	Δ
1870.65	357.8	22.41	3*n*	OΣ
1875.20	0.1	20.87	2*n*	Δ
1877.65	0.8	20.14	2*n*	Δ
1890.98	8.4	16.04	2*n*	Hl
1896.27	12.3	14.75	3*n*	A
1904.83	21.6	12.28	2*n*	β



Σ 634

[Ma (*F. S.* **I**)...OΣ (**IX**)...OΣ (*Mon. Not.* **XXXVI**, 198) (*Bul. Acad. St. Petersburg* **V**)...Δ (1185, 1735, 2077)...Δ (**I, II**)...Nobile (*Ren. della R. Accad. Sci.* Dec. 1877)...WS^2...Do (2242, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Pk...Je (2329, 2449)...Flm...Franz (2649)...Seagrave (*Sid. Mess.* **II**, 274). .Meyer (*Viertel. Nat. Gess. in Zurich*, 1874)...En (2663)...Hl (**I, II**)...Engelhardt (**III**)...A (3395)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk^5...β^6...]

$2^m 50^s$ **2549.** 15 *Orionis.* **OΣ 99** *rej.* Rejected in the second edition of the *Poulkowa Catalogue* as single. In 1843 Ma made an uncertain measure of the angle, but it has never been seen double by any modern observer. Hussey found it perfectly round with the 36-inch 1898 to 1900. There is no probability of its being really double.

[Ma (**XI**)...Hu (*Pub. L. O.* **V**)...]

3 14 **2551.** **Σ 648.** (= **S 467.**) "A third star 17m, and a fourth 16m, near enough to constitute it quadruple," H (II). In H (VII) they are referred to as *nf.* No sensible change in AB.

1866.67	72°4	4″78	3*n*	Δ
1893.10	70.8	4.65	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (**II, VII**)...Da^3...Ra (**XXIV**)...Bp...Wr...Ba (**II**)...En (1673)...Δ (1118)...Δ (**I, II**)...Glasenapp (**II**)...]

(See p. 1065)

3 23 **2552.** **A. G. 90.** Noted as oblong in *A. G. Berlin*, but found single in 1903 by Cogshall (*A. J.* 546).

2553. **S 468.** (= **Σ 650** *rej.*) Probably fixed. The A. G. positions give 164°4 : 26″68. $3^m 27^s$

1900.75	165°6	26″35	2*n*	β

[H (**VI**)...β^5...]

2554. **OΣ 100.** (= **H 693.**) Not measured by H. There is no material change. 3 28

1867.45	249°8	4″09	3*n*	Δ
1879.71	252.2	3.89	3*n*	β
1898.76	252.1	4.01	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Flm...β^1...β^3...Sk^3...Bryant (*Mon. Not.* **LIX**, 400)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3930)...]

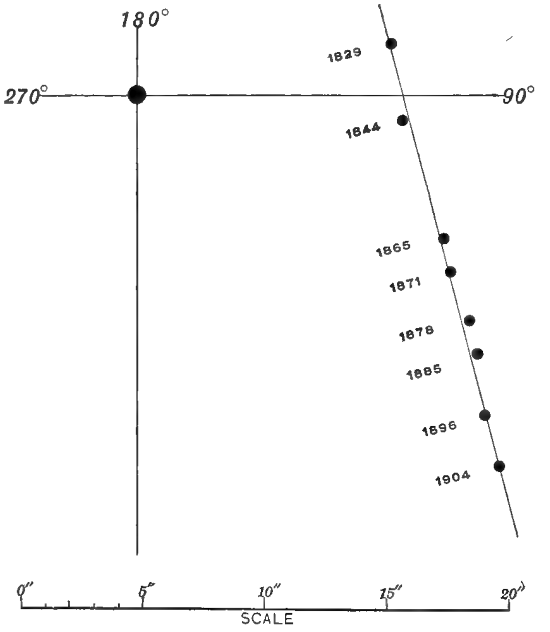
2555. **A. G. 91.** Measures from *A. G. Leipzig.* 3 32

2558. **Σ 629.** The change is due to proper motion. 4 4

1832.77	342°1	13″16	4*n*	Σ
1869.39	355.5	14.08	4*n*	Δ
1873.35	357.6	14.53	1*n*	OΣ
1896.27	2.0	15.27	3*n*	A

[Ma (*F. S.* **I**)...OΣ (**IX**)...Δ (1800)...⅃ (**II**)...Flm...WS^2...Sk...A (3395)...Doolittle (*Pub. Flower Obsy.* **I**)...Sk^5...]

2560. **Σ 651.** Change from proper motion. The measures of Σ, ⅃, and A give 0″239 in 193°0 for the proper motion of the larger star 4 14



Σ 651

1829.67	101°7	10″81	2*n*	Σ
1844.51	84.4	11.13	2*n*	Ma
1865.28	64.7	14.08	5*n*	Δ
1871.17	60.6	15.08	6*n*	Δ
1878.52	55.6	16.72	2*n*	Cin
1885.06	52.6	17.82	1*n*	Wilson
1896.15	47.4	19.55	2*n*	A
1904.77	44.3	21.51	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (V)...Hd...WS²...Δ (1572, 2192)...Δ (**II**)...Cin⁴...Cin⁵...Cin⁶...Sk...Sk²...Sk³...Wilson (Cin¹⁰)...Flm...Sk⁴...Sk⁵...A (3395)...Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

4^m^ 40^s^ **2563. See 47.** Discovered at the Lowell Observatory.

1899.75	55°7	3″02	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

4 53 **2565. β 885.** Discovered with the 18½-inch. Change uncertain.

1888.92	190°7	0″65	2*n*	Lv
1892.13	186.5	0.72	1*n*	Collins
1898.11	194.8	0.69	1*n*	Brown
1900.65	205.4	0.56	2*n*	Bryant

[β (**XIII**)...β³...Lv¹...Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) Brown (3645)...Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383)...]

(See p. 1065)

4 54 **2566. OΣ 101.** Relatively fixed.

1866.87	183°7	5″85	3*n*	Δ
1898.74	183.4	5.84	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

5 4 **2568. H 3269.** "A fine double star in Cluster VII, 4." The only measures are:

1880.03	60°9	19″71	2*n*	β³	8.1...9.7
1904.87	61.3	19.70	2*n*	β⁶	

5 12 **2569. A 210.** Discovered at Mt. Hamilton by Aitken (3784) (*Bul. L. O.* No. 16).

5 14 **2570. H 3727.** Not in SD. The only measures are:

1902.53	54°1	4″52	2*n*	β⁶	10.3...10.3

5 32 **2571. Hu 33.** Very close pair discovered by Hussey. In the Harvard Zones this star is given as having a companion 10″ distant *nf*. With the 6-inch in 1874 I could see only a much more distant star in about 80°.

[Hu (*A. J.* 480)...]

5 34 **2573. Σ 652.** (= **H 2254.**) Apparently fixed.

1867.32	182°9	1″66	3*n*	Δ

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**VII**)....Se....Se³....OΣ (**IX**)....Δ (1204)....Δ (**I, II**)...]

5 34 **2574. OΣ (App) 62.** B is W¹ V. 62, 5^s^8 *f* and 84″*n*.

1904.80	49°0	123″96	2*n*	β

[Δ (**I**)...β⁶...]

2576. β 1006. Discovered with the 12-inch on Mt. Hamilton in 1881. The following are all the later measures: 6^m^ 17^s^

A and B

1891.93	203°5	0″66	2*n*	β	8.5...9.0
1900.19	204.1	0.51	1*n*	Bryant	8.5...10.9

A and C

1891.93	178°2	52″40	2*n*	β	...8.7
1899.09	177.8	52.37	2*n*	β	...8.9

[β (**XIII**)...β³...β (3114) (*Pub. L. O.* **II**)...Bryant (*Mon. Not.* **LXI**, 486)...]

2577. H 1154. "Index-reading confused in MS." If this is O. Arg. N. 5625 (8-9), the R. A. should be 50^s^ more. 6 21

(See p. 1065)

2579. H 2253. "A third 11 m, about twice as far." 8 m in Arg. The principal star is given a proper motion of 0″059 in 90° (*A. G. Albany*). 6 37

1900.05	23°7	27″45	3*n*	Es	8.1...13.7

[Espin (3717)...]

2580. A 211. Discovered at Mt. Hamilton (*A. N.* 3784) (*Bul. L. O.* No. 16). 6 37

2581. *ι Leporis.* **Σ 655.** (= **H III. 67.**) No material change since Struve. H found 359°3 (1783.1), which, by the later observations, would seem to be 20° in error. Wr speaks of "a very red star of 5 m, 57^s^ *p*." This is W¹ V. 78, but 7 m. The large star has no sensible proper motion. 6 42

1867.69	336°2	12″58	4*n*	Δ
1899.90	337.0	12.67	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Wr...Flm...β³...Pk...Cin⁵.. Δ (**II**)...T (2898)...Wilson (Cin¹⁰)...A (3584)...Doolittle (*Pub. Flower Obsy.* **I**)...]

2582. H 359. In another observation in H (VII): 6 45

1823+	65° ±	6″ ±	1*n*	H	10...11

2584. *ρ Orionis.* **Σ 654.** (= **H N. 21 = S 469.**) Fixed. The proper motion of the large star is 0″019 in 267°1 (Auwers). 7 1

1866.27	64°9	6″79	3*n*	Δ
1888.13	65.0	6.90	3*n*	Hl
1903.19	63.0	6.88	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...J²...Da¹...Ra (**XXII**)...Se...Se³...Wr...WS...WS²...Gl...Pk...Sp (**II**)...Δ (**II**)...Hl (**II**)...Glasenapp (**II**)...Biesbroeck...]

2587. S 470. The components are SD (17°) 1046 and 1047. The only measures since South are: 7 14

1902.52	277°9	47″27	2*n*	β⁶	7.9...7.9

$7^m\ 18^s$ **2588.** **OΣ 517.** The angle appears to be slowly increasing, and it is probably a binary.

1871.83	296°.7	Cuneo	4*n*	Δ
1890.50	299.2	0″.36 ±	7*n*	Sp
1894.18	299.8	0.45 ±	2*n*	HΣ
1899.77	308.0	0.32	3*n*	Hu
1900.78	308.9	0.19	1*n*	β

The small star was added by Hall with the 26-inch. It appears to be fixed.

AB and C

1888.17	138°.3	6″.90	2*n*	Hl
1899.77	136.8	6.65	3*n*	Hu
1901.30	138.2	6.80	2*n*	β

[OΣ (**IX**)...Δ (**I**)...Hl (*Wash. Obsns.* 1880)...Hl (**I, II**)...Sp (**III**)...β^1...Flm ...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...β^5...]

7 31 **2589.** **A. G. 92.** Double in *A. G. Leiden.* Measures by β^6.

7 33 **2590.** **H 2257.** The only measures are:

1902.94	268°.0	34″.49	2*n*	β^6	7.8...11.5

7 36 **2591.** 14 *Aurigae.* **Σ 653.** (= **H 360** : AC = **Ḩ IV. 19** = **Sh 52.**) No change in the bright stars. Later measures of B show some motion in angle and distance. The principal star has a proper motion of 0″.014 in 334°.1 (Auwers).

A and B

1866.25	347°.8	11″.63	4*n*	Δ
1872.17	348.1	11.79	2*n*	Du
1885.11	349.8	11.67	1*n*	Per
1895.25	351.0	11.45	2*n*	HΣ

A and C

1865.40	225°.4	14″.72	4*n*	Δ
1893.04	224.7	14.31	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...K...Wr...Ba (**I, II, III**)...H (**VII**)... Se^1...WS^2...Bp...P^1...Ra (**XXI**)...Da^3...Gl...Pl...Bl (**V**)...Du...Pk ...Per...Per (2748)...En (2663)...Δ (1185, 1572)...Δ (**I, II**)...Sk^2...Sk^3... Maw (**I**)...Glasenapp (**II, III**)...Solá (3563)...HΣ (**XII**)...Do (3930)...]

7 37 **2592.** **OΣ 102.** This star was seen elongated by OΣ in 1848, 1851, 1852, and 1861, the estimates of the angle ranging from 177° to 191° Ma (XI) has an observation, 34°.5 : 0″.35 (1843.22) 2*n*. Dembowski found it round in 1870, as I did with the 6-inch in 1875. Hussey found it perfectly round with the 36-inch in 1898–99; and I found it certainly single with the 40-inch in 1900. It is practically certain that this star is not double.

[OΣ (**IX**)...Ma (**XI**)...Δ (**I**, p. 227)...Hu (*Pub. L. O.* **V**)...β^5...]

7 39 **2593.** **Σ 664.** Fixed.

1866.98	167°.3	4″.85	3*n*	Δ
1893.04	170.4	4.53	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Se...Se^3...Ra (**XXVI**)...Δ (1204)... Δ (**I, II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

2594. *κ Leporis.* **Σ 661.** No change. The distance in Σ would seem to be too large. The large star has a proper motion of 0″.034 in 256°.6 (Auwers). $7^m\ 40^s$

1866.16	357°.5	2″.41	4*n*	Δ
1880.19	359.3	2.59	4*n*	Sp
1880.42	360.7	2.67	3*n*	β
1888.02	358.3	2.68	2*n*	T
1900.12	359.9	2.54	1*n*	Lunt

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...H (**VIII**)...WJ^2...Ra (**XXII**)...Wr...Se... Se^3...Δ (1118)...Δ (**I, II**)...Pk...β^3...Cin^4...Cin^6...Sp (**II**)...LM... T (2898)...Lunt (*Mon. Not.* **LXI**, 583)...Do (3798, 3799)...]

2597. *α Aurigae.* **Capella.** (AF = **Ḩ VI. 30** = **H 2256** : AG = **Sh 51.**) The nearest star B was found by Barnard with the 40-inch. The three small stars, C, D, and E, were noted with the 18½-inch. The principal star has a proper motion of 0″.435 in the direction of 170°.3 (Auwers). The change in F corresponds to this motion. No other measures of the small stars. A series of measures, 1851–55, of F by OΣ for parallax will be found in OΣ (X). From these observations he deduced a parallax of 0″.305 (*Bul. Phys.-Math.* XIV, 13). *Capella* is a spectroscopic binary, discovered by Campbell (*Astrophys. Jour.* X, 177). The elongation seen and measured at the Greenwich Observatory was probably not real, in view of the failure of other large apertures, under the most favorable conditions, to show any trace of a close component. 7 49

[OΣ (**X**, p. 66)...β^1...β^3...Engelhardt (**II**)...Barnard (*A. J.* 447)...Greenwich Obsy. (*Mon. Not.* **LX**, 595; **LXII**, 399; **LXIII**, 416)...Hu (*A. J.* 484)(*Pub. A. S. P.* **XII**, 201)...Newall (*Mon. Not.* **LX**, 418)...]

2599. **See 48.** The later measures are: 8 5

1899.40	3°.4	2″.60	2*n*	Cg	9.5...11.0

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

2601. **A 212.** Discovered at the Lick Observatory. No other measures. 8 10

[A (3784)(*Bul. L. O.* No. 16)...]

2602. **Σ 658.** Unchanged. 8 24

1868.69	187°.3	5″.68	4*n*	Δ
1904.83	187.5	5.78	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

2603. **Σ 662.** Erroneously entered in *Pos. Med.* with Decl. −4° 16′. Companion easily seen with the 6-inch, and A identified as here given. Apparently fixed. 8 35

1867.15	104°.5	5″.23	3*n*	Δ
1904.83	103.6	5.45	2*n*	β

[Ma (*F. S.* **I**)...Δ (1475)...Δ (**II**)...β (*Mon. Not.* **XXXIV**, 372)...β^6...]

2604. **Σ 665.** Change uncertain. 8 38

1867.98	256°.1	1″.71	3*n*	Δ
1893.08	253.2	1.47	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...]

8m 47s **2605.** β *Orionis.* β 555. (AB = H II. 33 = Sh 53 = Σ 668.) In 1871, while examining Rigel with the 6-inch, I suspected an elongation of the companion, and called the attention of observers with larger instruments to this star. In 1878 I examined it very carefully with the 18½-inch, and saw and measured what I felt certain was a real and measurable elongation of the small star. The measured distances were noted at the time as being too large. When on Mt. Hamilton with the 6-inch, in 1879, I again measured the position-angle, and regarded the elongation as not due to atmospheric causes. This star was scrutinized with the 18½-inch at Chicago a number of times from 1880 to 1882, but at all times it appeared either round or very doubtful. In 1889 and 1890 it was certainly single with the 36-inch, with the highest powers under the very best conditions. If the distance had been as much as 0″.05, it would have been noticed on some of these occasions with the large refractor. At this time it seemed at least possible that the observed elongation was not real, and that it was not double after all. Later the duplicity was fully confirmed by Aitken and Hussey with the 36-inch refractor at Mt. Hamilton. Since that time these observers, at my special request, have examined this star at frequent intervals. The distance is probably always under 0″.2, and apparently this lasts but a short time. The components are so nearly equal that the quadrants given by the different observers have no significance, and all are subject to a correction of 180°. That this pair is in very rapid motion cannot be doubted, and the period may be shorter than that of any known pair. To determine this it must be observed at frequent intervals, at least several times each year, and only the most powerful telescopes, with the best atmospheric conditions, are suitable for this purpose. At the times of maximum distance smaller apertures may be used, but the most important observations will be when the distance is less, or the star apparently single.

B and C

1871.90	B elongated in direction of A (200°)			β	
1876.20	B elongated in 170°–180°			Sadler	
1878.14	172°.8	0″.35	2n	β	
1878.80	55.±	0.25±	2n	Russell	
1879.68	125.9	....	5n	β	
1879.76	158.7	0.4±	1n	Cin	
1880–82	Doubtful with 18½-in.			β	
1880.17	Single		2n	Sp	
1882.21	Single		2n	Sp	
1884.14	178.0	....	3n	Henry	
1887	Always single			Tarrant	
1889.09	Round with 36-in.			β	
1890.83	Single with 2600, 36-in.		3n	β	
1891.73	Single with all powers, 36-in.			β	
1892.88	Single, 36-in.			Barnard	
1898.87	178.0	0.16	3n	A	
1898.88	178.4	0.12±	1n	Hu	
1899.63	195.6	0.14	3n	A	
1899.82	172.7	0.1±	1n	Barnard	
1899.92	210.6	0.16	1n	A	
1901.04	179.3	0.36	1n	Lewis	
1901.72	Uncertain, 36-in.		2n	A	
1902.00	158.4	0.44	1n	Lewis	
1903.04	17.2	0.09	1n	A	"Certainly double"
1903.14	10.8	0.11	1n	A	"Elongation real"
1903.79	135°.5±	00″.5±	1n	A	"Apparently elongated, but very close"
1903.8	136.5±	0.05±	1n	A	"Elongation certain; distance too small for measures"
1903.8	138.5	<0.1	1n	A	"Elongation slight, but I think real"
1904.81	"Perhaps slight elongation, but too slight for certainty." Power 3000				
1904.94	"Elongation uncertain with powers to 3000"				

The last seven observations given above, showing the results of frequent examinations of this star by Aitken with the 36-inch refractor at Mt. Hamilton, have a special value, and will be important hereafter in adjusting the earlier scattering measures. The observations were made with powers 2,000 to 3,000 under favorable conditions.

There has been no change in the position of B with reference to A. It has been frequently measured and by most of the double-star observers Enough measures are given to show relative fixity.

Auwers gives the proper motion of Rigel 0″.018 in the direction of 293°.2. This movement would not affect the distance of the Herschel companion, but would decrease the angle 7°.6 between the measures of Σ and those of 1898. It is therefore practically certain that A and BC form a physical system.

The faint star D was first mentioned by Mitchel in 1846. The measures below are all that have ever been made of this star.

A and BC (= Σ 668)

1831.53	199°.8	9″.14	3n	Σ	1.0...8.0
1845.94	199.1	9.39	4n	Ma	
1852.20	199.4	9.69	4n	Ma	
1865.33	201.1	9.47	5n	Δ	...7.8
1876.91	201.3	9.32	6n	Sp	
1881.05	202.0	9.31	4n	Je	
1888.13	202.1	9.74	4n	Hl	
1898.89	201.7	9.62	2n	A	
1898.92	201.4	9.55	2n	β	

A and D

1878.82	1°.5	44″.48	2n	β	...12.5
1892.07	1.4	44.44	2n	β	...13.5
1898.83	1.3	44.10	3n	β	...13.5

The following references relate to the duplicity of B:

[β (X) ... β (*Eng. Mech.* Feb. 9, 1872) (*Mon. Not.* **XXXVIII**, 476) ... β1 ... β2 ... β3 ... β (2929, 3048, 3114) (*Pub. L. O.* **II**) ... Sadler (*Eng. Mech.* Feb. 4, 1887) ... Russell (*Pub. Sidney Obsy.* 1871–81) (*Observatory*, **II**, 374) ... Cin6 ... T (2898) ... Sp (**II**) ... Lewis (*Mon. Not.* **LXII**, 386; **LXIII**, 405) ... A (3584, 3638) (*Bul. L. O.* No. 11) ...] (See p. 1065)

The following relate to the wide pair:

[H1 ... H2 ... Ma (*F. S.* I) ... Ma (**XI, XII, XIII, XV**) ... Da1 ... Se ... Se3 ... Lassell (858) (*Mon. Not.* **XIII**, 183) ... Wr ... Fl ... WS ... WS2 ... Gl ... Kn ... Ra (**XXII**) ... Do (2196, 2899, 3798, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Wn (*Ast. Beob. Sternwarte zu Berlin*, **V**) .... Δ (1185, 1735) (**I, II**) .... Mitchel (*Sid. Mess.* May 1847) ... Cin4 ... Cin5 ... Cin6 ... Sp (**II**) ... Je (2449) .... Maw (**I**) .... Lunt (*Mon. Not.* **LXI**, 583) .... Hl (**II**) .... Glasenapp (**II**) .... Biesbroeck ...]

2606. Σ 667. (= H I. 54.) Fixed. 8m 52s

1866.41	313°.0	3″.99	3n	Δ
1887.99	313.0	4.14	2n	T

[Ma (*F. S.* I) ... Ma (**XI**) ... J2 ... Se ... Hd ... Cin5 ... Cin6 ... Δ (**II**) ... T (2898) ... Wilson (Cin10) ...]

$8^{m}\ 54^{s}$ **2607.** **β 317.** Discovered with the 6-inch. Evidently fixed. See measures a distant star 46°5:18″75 (1898.14) 1*n*. The later measures are:

1877.11	11°6	8″06	1*n*	Cin
1891.87	11.8	8.53	3*n*	β
1898.14	11.3	8.95	1*n*	See

[β (**VI**)...β (2062, 3114) (*Pub. L. O.* **II**)...Cin^{3}...Cin^{4}...See (   )...]

9 11 **2609.** **Σ 657.** Apparently some change in the angle.

1854.02	277°7	1″34	4*n*	OΣ
1868.90	277.4	1.15	5*n*	Δ
1878.84	280.2	1.24	1*n*	β
1897.62	283.1	1.27	4*n*	Doo

[Ma (*F. S.* **I**)...H (**V**)...Bp...Da^{3}...OΣ (**IX**)...Se...Δ (1118)...Δ (**I, II**)...β^{3}...Doolittle (*Pub. Flower Obsy.* **I**)...]

9 14 **2610.** **Σ 666.** (= **H II. 48** = **S 471.**) Fixed.

1867.09	74°7	2″91	3*n*	Δ
1895.25	73.9	2.92	2*n*	HΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Se...Se^{3}...Wr...Ra (**XXIII**)...Du...Δ (1204)...Δ (**I, II**)...Per...Knorre (3518, 3632)...HΣ (**XII**)...]

9 22 **2611.** **Σ 656.** No change since Struve.

1868.26	216°4	2″83	4*n*	Δ
1904.83	215.2	2.92	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

9 31 **2612.** **Weisse 7.** Noted "duplex" in Weisse. Not a double star of any class (1901.79). There is a 4″ pair of 12 m stars in the field.

[β^{5}...]

9 43 **2613.** **Σ 670.** **B. A. C. 1625.** Very little if any motion.

1867.66	167°0	2″30	3*n*	Δ
1894.17	166.1	2.42	2*n*	HΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...H (**V**)...Se...Se^{3}...Ra (**XXII**)...Δ (1204)...Δ (**I, II**)...Glasenapp (**II**)...HΣ (**XII**)...]

9 58 **2615.** **Σ 671.** Fixed, unless distance increasing.

1868.09	125°4	17″44	4*n*	Δ
1904.83	125.0	17.84	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Glasenapp (**II**)...β^{6}...]

10 0 **2616.** **β 885½.** Discovered with the 18½-inch. No motion.

1898.87	69°3	2″30	1*n*	Hu
1899.05	67.2	2.50	1*n*	β

[β (**XIII**)...β^{3}...Hu (*Bul. L. O.* No. 44)...β (*Pub. Y. O.* **I**)...]

10 3 **2617.** **Σ 659.** Fixed.

1867.47	314°9	5″59	3*n*	Δ
1904.83	314.3	5.70	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

$10^{m}\ 9^{s}$ **2618.** **Σ 669.** Fixed.

1866.25	277°0	9″94	3*n*	Δ
1904.83	277.0	9.76	2*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

10 11 **2619.** **β 1334.** (AC = **Σ 675.**) In recently measuring the Struve companion with the 40-inch, a much nearer star was found:

A and B

1904.81	349°3	1″69	2*n*	β	9.0...13.5

There is no change in the distant star:

A and C

1867.66	6°6	9″31	3*n*	Δ
1904.79	6.6	9.43	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Gl...β^{6}...]

10 12: **2620.** **Σ 672** *rej.* Neither of the two DM stars near this place is double, and nothing found near (1904). With an error of 5^{m} in R. A., this might be H 3269 (No. 2568).

10 14 **2621.** **A. G. 93.** Noted as "oblong" in *A. G. Lund.* Certainly not double with the 40-inch (1902.74) with good conditions.

[β^{6}...]

10 15 **2622.** **β 318.** Discovered with the 6-inch. Probably a physical pair, as there is a common proper motion of 0″11 in 180°0 (Bossert).

1883.13	226°2	0″55	1*n*	Sp
1898.78	234.2	0.64	3*n*	A
1898.93	229.9	0.78	2*n*	Cg

[β (**VI**)...(2062)...Δ (**I**)...Cin^{5}...LM...Sp (**II**)...Brown (3645)...A (3584)...Cogshall (*A. J.* 478)...]

10 18 **2623.** 16 *Aurigae.* **OΣ 103.** These stars appear to be relatively fixed, but have a common proper motion which is given:

Porter	0″159 in 166°3
Bossert	0.168 in 162.6

1869.82	57°0	4″36	5*n*	Δ
1878.65	54.3	3.96	1*n*	β
1896.31	54.6	3.80	3*n*	A
1898.74	55.2	4.28	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Bl (**V**)...β^{1}...A (3395)...Hu (*Pub. L. O.* **V**)...]

10 19 **2625.** **Σ 674.** Unchanged. This is DM (19°) 886. Not in Weisse or Lalande.

1868.04	147°6	10″31	4*n*	Δ
1904.77	147.7	10.22	2*n*	β

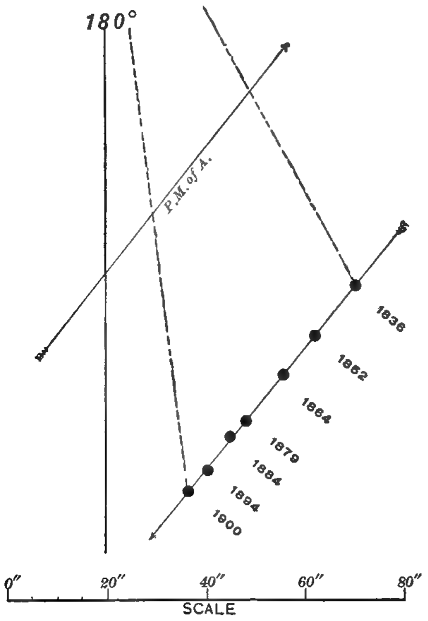
[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Δ (**II**)...β^{6}...]

$10^{m}\ 42^{s}$ **2627.** λ *Aurigae.* (AD = **♅ V. 22 = S 472 = Σ 3, App. II.**) The nearest star was added by me with the 40-inch in 1900, and C with the 18½-inch in 1879. The principle star has a large proper motion:

Auwers	0″833 in 141°9
Bossert	0.838 in 141.9
Σ-β measures	0.856 in 140.6

No other measures of B, but this, like C and D, is doubtless an optical companion. These are all the measures of AC:

1879.28	197°6	40″47	3*n*	β
1901.05	225.0	33.83	3*n*	β



λ Aurigae AD

The following are some of the measures of the Herschel star:

A and D

1836.21	29°0	103″60	3*n*	Σ
1852.14	22.7	109.43	2*n*	Σ
1864.51	18.2	114.59	5*n*	Δ
1879.28	13.6	121.53	3*n*	β
1884.09	11.8	124.16	2*n*	HΣ
1894.06	9.1	130.01	1*n*	Big
1900.78	7.2	133.51	2*n*	β

[OΣ (**X**, p. 67)... Δ (**II**)... Δ (1575)... Flm... Bl (**V**)... Sk^{3}... β^{3}... Engelhardt (**II**)... Big (*Bul. Ast.* **XII**, 299)... Sk^{4}... Sk^{5}... β^{5}...]

10 42 **2628.** **Σ 663.** Probably unchanged. The principal star is DM (66°) 391.

1866.25	76°6	2″88	3*n*	Δ
1904.97	77.0	3.16	2*n*	β

[H (**IV**)... Ma (*F. S.* **I**)... Δ (**II**)... β^{6}...]

10 46 **2630.** **♅ V. 88.** Identified as given in Part I. There are two faint stars between A and B. In the field with λ *Aurigae.*

1901.18	217°5	32″44	2*n*	β^{5}	9...10

2631. **Espin 59.** A wide pair of small stars noted by Espin. In measuring this, I noticed a faint 5″ pair in the direction of 169°2. $10^{m}\ 49^{s}$

[Espin (*Liverpool Ast. Soc.* **I**, 10) (*Eng. Mech.* **XXXVI**, 448) (*A. N.* 3784)...]

2632. **Howe 12.** The only later measures are: 10 52

1900.07	237°2	2″46	1*n*	Lunt

[Cin^{4}... Lunt (*Mon. Not.* **LXI**, 583)...]

2633. **A 52.** The only later measure is: 11 0

1904.84	160°0	1″94	1*n*	β	8.7...11.8

[A (3668)... β^{6}...]

2634. **Σ 678.** Perhaps a little change in angle. A distant star in Glasenapp, 339°0:75″28 (1893.16) 2*n*. 11 17

1868.73	99°1	3″34	4*n*	Δ
1893.15	101.2	3.02	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**V**)... Δ (**II**)... Glasenapp (**II**)...]

2635. **Ho 18.** The only later measure is: 11 28

1898.85	163°4	4″09	1*n*	Barnard

[Ho (2778)...]

(See p. 1065)

2636. **Σ 673.** Probably without change. 11 31

1848.25	274°7	1″14	1*n*	Ma
1866.51	268.7	1.13	3*n*	Δ
1898.06	266.4	1.31	3*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XIII**)... Δ (**II**).... Doolittle (*Pub. Flower Obsy.* **I**)...]

2637. **Σ 681.** Fixed. 11 42

1866.29	180°5	23″26	3*n*	Δ
1878.89	180.8	23.21	1*n*	β
1904.88	180.5	23.34	2*n*	β

[Ma (*F. S.* **I**)... H (**V**)... Bl (**V**)... Δ (**II**)... β^{3}... β^{6}...]

2638. **Weisse 8.** "Duplex 3″" in Weisse. A third star added with the 40-inch. Measures from β^{5}. 11 43

2639. τ *Orionis.* **β 188.** (ABD = **♅ V. 25 = H 2259.**) The attendant to the ♅ companion was discovered with the 18½-inch. ♅ failed to see D, which was added by H (*Fifth Catalogue*). So far there is no change in BC. 11 47

Auwers gives the proper motion of the principal star 0″035 in the direction of 290°1.

B and C

1878.26	50°8	4″10	4*n*	β	
1891.94	51.4	3.79	3*n*	β	11...11.6

A and B (= ♅ V. 25)

1868.08	248°3	31″28	1*n*	Hd
1876.22	250.1	36.01	2*n*	Hl
1891.94	249.2	35.27	3*n*	β
1899.02	250.3	35.01	1*n*	β

A and D (= H 2259)

1876.22	59°8	35″99	2*n*	Hl	
1877.95	60.0	36.09	1*n*	β	
1891.94	60.0	35.97	3*n*	β	...10.7
1899.02	60.0	36.02	1*n*	β	

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β^{1}...β^{2}...β^{3}...β (3114) (*Pub. L. O* **II**) (*Pub. Y. O.* **I**)...Hd...H (**V**)...Hl (**I**)...]

11^{m} 48^{s} **2640.** **H 3272.** "In Cluster VII, 33." Without change in the last twenty years.

AB	1879.86	341°7	19″58	2*n*	β	8.0...11.2
	1901.25	342.0	19.44	2*n*	β	
AC	1879.86	295.0	29.36	2*n*	β	...11.7
	1901.25	295.2	29.16	2*n*	β	
AD	1879.86	42.7	33.48	2*n*	β	...10.7
	1901.40	42.3	33.36	2*n*	β	

[β^{3}...β^{5}...]

12 1 **2641.** **Kr 26.** Noted as double in *A. G. Hels.*

[β (3042) (*Pub. L. O.* **II**)...Espin (3717)...]

12 9 **2644.** **Σ 680.** Without change.

1866.83	203°2	9″01	3*n*	Δ
1904.79	201.5	9.11	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Δ (**II**)...β^{6}...]

12 10 **2645.** **S 473.** (= σ 168.) B is Lalande 9949, 1^{s}3 *p*, and 10′ *n*. There is no evidence of change. The magnitudes in SD are 7.2 and 8.6.

1880.35	305°6	20″63	3*n*	β
1904.80	306.3	20.56	2*n*	β

[β^{1}...β^{3}...β^{6}...]

12 21 **2647.** **Σ 679.** Fixed.

1866.86	315°9	19″70	3*n*	Δ
1890.15	315.7	19.39	3*n*	T

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...T (3185)...]

12 22 **2648.** **Σ 682** *rej.* Description from H (V). Identified and measured:

1904.80	97°1	19″33	2*n*	β^{6}	9.3...9.8

12 25 **2649.** **See 49.** Later measures are:

1899.80	196°2	4″39	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

12 55 **2650.** **Σ 683.** Fixed.

1868.30	79°5	11″88	4*n*	Δ
1890.15	79.2	11.87	3*n*	T

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...T (3185)...]

2652. **Σ 676.** Modern observers make the angle smaller, but it is doubtful if any change has occurred. 13^{m} 4^{s}

1846.32	277°0	0″88	3*n*	OΣ
1850.27	272.9	0.90	2*n*	OΣ
1865.57	275.6	0.97	4*n*	Δ
1880.06	271.5	1.01	3*n*	Hl
1883.65	277.5	1.24	7*n*	En
1890.99	274.2	1.01	3*n*	Hl

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...OΣ (**IX**)...Δ (1473)...Δ (**II**)...En (2663)...β^{2}...Hl (*Wash. Obsns.* 1880)...Hl (**I, II**)...Flm...]

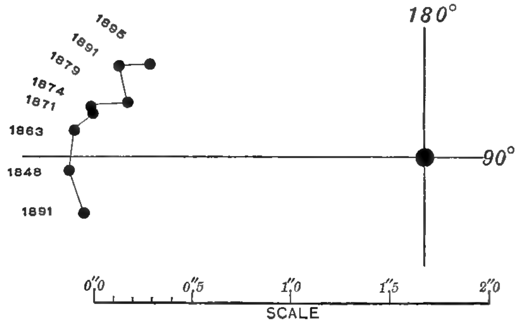
2654. **A 53.** This star has a large proper motion, 0″690 in 77°5 (Kustner). 13 6

1901.12	47°5	5″07	3*n*	β

[A (3668)...β^{5}...]

2655. **Cordoba.** Double in *Cordoba G. C.* Measures by Innes (*Mon. Not.* LXI, 583; LXIV, 131). 13 14

2657. **Σ 677.** Binary in slow retrograde motion. 13 24



Σ 677

1831.77	279°4	1″74	4*n*	Σ
1848.04	272.4	1.80	4*n*	OΣ
1863.15	265.8	1.78	4*n*	Δ
1871.80	262.4	1.69	2*n*	OΣ
1874.18	261.6	1.71	1*n*	Δ
1879.54	259.8	1.53	3*n*	Hl
1891.00	253.6	1.61	3*n*	Hl
1895.92	251.3	1.46	2*n*	Collins

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Δ (1109, 1473)...Δ (**I, II**)...Flm...Hl (*Wash. Obsns.* 1880)...Hl (**I, II**)...Big...Do (2303)...En (2663)...Collins (*A. J.* 378)...HΣ (**XII**)...]

2658. **Σ 684.** Probably unchanged. 13 24

1867.17	139°9	1″50	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XIII**)...WS...WS^{2}...Gl...Δ (**II**)...]

2659. **A 213.** Discovered at the Lick Observatory by Aitken (*Bul. L. O.* No. 16) (*A. N.* 3784). 13 28

13^m 30^s **2660. See 50.** This star has a proper motion of 0″356 in 90° (Rad.^{3}). No other measures.

[See (*A.J.* 431)...]

13 37 **2661. Σ 686.** Very little if any change.

1867.03	222°7	9″27	4*n*	Δ
1893.09	222.1	8.83	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Ra (**XXVIII, XXIX**)...Se...Se^3...Hd...WS...Gl...O. Stone (2201)...Δ (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

13 43 **2662. Σ 688.** (= ♅ III. 94 = S 474.) Probably fixed. (See No. 2665.)

1868.56	274°6	10″25	4*n*	Δ
1893.14	273.2	10.36	2*n*	Gla

[Ma (*F. S.* **I**)... H (**VIII**)...Ra (**XXVIII, XXIX**)... Pt ..Cin^5...Wilson (Cin^{10})....Δ (**II**)....Sp (**II**) as ♅ III. 94....Glasenapp (**II**)....*Annals Toulouse Obsy.* **III**...]

13 48: **2665. ♅ III. 94.** (= σ 166.) There is no pair in this place. This is Σ 688, with error in Decl., and position-angle reversed.

14 2 **2666. S 476.** H (VIII) gives magnitudes, 6 = 6; H^3 7...7½. These stars are O. Arg. S. 3859 and 3860. The only later measures are:

1902.36	18°0	39″12	2*n*	β^6	6.8...6.9

14 15 **2668. OΣ 104.** The angle is constant, but the distance is increasing, probably from proper motion.

1851.27	191°0	16″29	1*n*	OΣ
1866.81	191.7	16.64	3*n*	Δ
1896.29	189.2	17.53	3*n*	A
1898.75	189.8	17.91	4*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)... Flm...Δ (**I**)... A (3395)... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

14 24 **2669. β 886.** (ABC = Σ 687.) The duplicity of the distant Σ companion was discovered with the 18½-inch. There is no change in the wide triple. Change in CD is doubtful.

C and D

1892.07	253°8	0″77	3*n*	β
1900.65	254.5	0.83	8*n*	Lewis
1900.97	255.5	0.99	2*n*	Doo

A and B (= Σ 687)

1867.22	68°7	17″20	3*n*	Δ
1882.23	68.5	17.51	3*n*	β
1892.06	67.9	17.30	2*n*	β
1898.19	68.9	17.57	2*n*	Lewis

A and C (= Σ 687)

1867.22	153°6	48″78	3*n*	Δ
1882.24	153.2	48.48	2*n*	β
1892.06	153.9	48.53	2*n*	β

[β (**XIII**)...β^3...β (3141) (*Pub. L. O.* **II**)...Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...Doolittle (*A. J.* 547)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486; **LXIII**, 403; **LXIV**, 792)...]

2670. *Orionis* 81. **β 189.** Discovered with the 6-inch. The change, if any, is small. Lalande 10023. 14^m 33^s

1891.92	286°5	4″09	3*n*	β
1898.92	286.8	4.40	3*n*	Bd

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β (3114) (*Pub. L. O.* **II**)...Δ (**I**)...Boothroyd (*A. J.* 478)...]

2671. Σ 685. Probably unchanged. 14 33

1866 52	314°7	2″05	3*n*	Δ
1897.19	312.4	2.45	2*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XII, XIII**)...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

2672. β 887. Discovered with the 18½-inch. The two faint stars were added with the 36-inch. Lewis measures a more distant star, 351°6 : 38″18 (1903.07) 1*n*, which is double, 359°5 : 2″33 (1903.07) 1*n* 12.5...13.5. 14 33

The following are all the later measures of AB:

A and B

1891.90	192°0	0″96	3*n*	β
1898.25	198.0	0.91	1*n*	Lewis
1898.84	189.4	0.87	1*n*	β
1898.89	193.6	1.10	1*n*	Barnard
1902.67	187.8	1.01	2*n*	Lewis

A and D

1891.90	332°1	10″66	3*n*	β
1898.84	332.0	10.47	1*n*	β
1902.67	332.8	10.50	2*n*	Lewis

[β (**XIII**)...β^3...β (3113)...β (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXIII**, 403; **LXIV**, 792)...]

2673. *Orionis* 82. **β 190.** (AC = ♅ IV. 87 = Σ 692 = S 475.) The close pair was discovered with the 6-inch. There is no change in the wide pair. The principal star is Lalande 10029. 14 38

A and B

1879.88	363°8	0″53	4*n*	β
1887.98	363.7	0.60	3*n*	T
1890.98	358.5	0.54	3*n*	β
1898.86	356.4	0.64	2*n*	A

AB and C (= Σ 692)

1783.73	7°7	29″30	1*n*	♅
1825.05	6.8	35.68	2*n*	S
1867.64	3.9	34.84	3*n*	Δ
1890.99	3.9	34.90	2*n*	β
1898.86	3.7	34.98	2*n*	A

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β^1...β^3...β (3048) (*Pub. L. O.* **II**)...Δ (**II**, p. 121)...Cin^4...T (2899)...A (3584)...En...]

2676. OΣ 105. (= Ho 225.) Probably no change. 14 56

1870.05	110°5	0″62	2*n*	Δ
1888.61	111.5	0.36	2*n*	Ho
1898.58	110.0	0.53	4*n*	Hu
1903.48	106.5	0.53	2*n*	Bowyer

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Ho (2977)...Lewis and Bowyer (*Mon. Not.* **LX**, 497; **LXI**, 486; **LXIV**, 792)...Hu (*Pub. L. O.* **V**)...]

(See p. 1065)

$15^m\ 20^s$ **2677.** *Leporis* 28. **H** 3750. "Most beautiful double star." Later measures make the angle less, but change is uncertain. This star is L 10063. In O. Arg. 5 m.

1879.11	281°3	4″14	1*n*	Cin
1879.13	283.3	4.26	1*n*	β
1896.93	277.2	3.15	2*n*	Scott
1903.14	280.0	3.50	2*n*	Scott

[Sadler (*Observatory* **IX**, 356)...Ellery (*Observatory*, **IX**, 334)...Cin^5...Cin^6...β^1...β^3...Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon. Not.* **LXIV**, 52)...]

15 20 **2679.** **H** 363. "The eye must be turned aside to see the small star." In DM 8.7 m. I could not find any pair here with the 40-inch, 1903.88. The DM star in this place has no companion.

15 21 **2680.** **Σ** 691. Fixed.

1866.89	299°9	25″44	3*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

15 24 **2681.** **H** 697. In B. A. C. 6 m; not in Heis, or Arg. U. N. The large star is given a proper motion of 0″017 in 339°4 (*A. G. Nico*).

A and B

1878.99	59°8	32″40	1*n*	β^3	6 ...13
1901.30	59.8	33.08	2*n*	β^5	6.8...11.7

A and C

1878.99	109°8	36″81	1*n*	β^3	...12
1901.30	111.5	38.44	2*n*	β^5	...11.2

15 32 **2682.** **Ma** 2. From list of new pairs in Ma (XI). Place from τ *Orionis* with micrometer. The distant star, given below, is not in Ma. The only measures are:

AB	1877.86	159°5	3″01	1*n*	β^1	
	1901.78	159.4	3.11	2*n*	β^5	9.2...9.2
AC	1877.86	137.7	34.6	1*n*	β^1	

15 37 **2683.** **Σ** 693. Unchanged.

1868.35	9°2	3″42	3*n*	Δ
1888.12	7.9	3.50	2*n*	T

[Ma (*F. S.* **I**)...Δ (**II**)...β^1...T (2991)...]

15 47 **2684.** **OΣ** 106. Without change. A measure in Ma (XI), 48°3 : 1″56 (1843.23) 1*n*, evidently belongs to some other pair.

1867.49	42°0	9″28	3*n*	Δ
1898.38	41.2	9.44	3*n*	Hu

[Ma (**XI, XIII**)...Ba (**I**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

16 0 **2686.** **β** 1317. Discovered with the 40-inch in measuring No. 2689.

[β^6...]

(See No. 13052)

2687. **Σ** 689. Error of 2 m R. A. in *Mens. Micr.* Fixed. $16^m\ 16^s$

1868.63	324°5	5″86	4*n*	Δ
1898.50	324.1	6.28	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XII**)...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

2689. **A. G.** 94. Double in *A. G. Lund*. Measures by β^6. 16 24

2690. σ *Aurigae*. **β** 888. Discovered with the 18½-inch. The proper motion of this star is 0″027 in the direction of 272°1 (Auwers). The interval covered by the measures is too short to tell with certainty whether the companion is moving with it. The faint stars, C and D, were noted with the 40-inch. The following are all the later measures: 16 30

A and B

1890.97	167°1	8″60	3*n*	β
1898.82	166.3	8.65	4*n*	β

[β (**XIII**)....β^3....β (*Observatory*, **III**, 451)....β (3048) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)....]

2691. **Σ** 690. The distance is increasing. These are all the measures since Struve: 16 30

1867.80	10°7	19″68	4*n*	Δ
1903.76	10.8	20.58	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^6...]

2692. 23 *Orionis*. **Σ** 696. (= **H IV.** 84 = **Sh** 54.) No material change since Struve. The principal star has a proper motion of 0″021 in 264°5 (Auwers). 16 32

1868.39	27°9	32″13	4*n*	Δ
1889.96	28.5	31.78	4*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**V**)...WS^2...Ba (**II**)...Ra (**XXII**)...Gl...Pk...Δ (1118)...Δ (**I, II**)...En...En (2663)...Giacomelli (**I**)...Hl (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

2693. **Σ** 697. Fixed. The proper motion of A is given 0″013 in 301°2 (*A. G. Berlin*). 16 38

1865.75	285°4	25″91	3*n*	Δ
1893.06	285.0	26.04	2*n*	Gla

[Ma (*F. S.* **II**)...H (**VI**)...En...Ra (**XXVI**)...Δ (1204)...Pl...Δ (**I, II**)...Glasenapp (**II**)...]

2694. **Σ** 694. There is no change in AB, but some of the measures are discordant. The faint star, C, was added by Hall with the 26-inch. 16 38

1868.73	3°4	1″25	4*n*	Δ
1887.18	.6	1.30	8*n*	Hl
1903.10	5.4	1.33	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Da^3...OΣ (**IX**)...Wn (1738)...Wn (**V**)...Se...Bp...Ba (**II, III**)...Δ (1118)...Δ (**I, II**)...Pl...Sk^2...WS^2...Bru^2...Hl (*Wash. Obsns.* 1885–86)...Hl (**I, II**)...T (3185)...Glasenapp (**II**)...Collins (*A. J.* 378)...Do (3930)...]

$16^m\ 51^s$ **2695.** **H 3752.** Measures from H³. The later measures are discordant, and motion is doubtful.

1856.11	110°0	2″86	1*n*	Se
1876.07	104.5	3.48	4*n*	Cin
1878.74	103.4	2.88	5*n*	Cin
1892.94	104.0	3.30	2*n*	Jones
1903.14	101.1	3.05	2*n*	Scott

[H³...WJ...WJ²...Se¹...Se³...Flm...Cin³...Cin⁴...Cin⁵...Jones (*Proc. Haverford. Coll. Obsy.* 1892)....T (2991)....Do (3378, 3798, 3799)....Searle (*A. J.* 299)...Scott (*Brit. Ast. Ass'n* **VI**, 248)(*Mon. Not.* **LXIV**, 52)...See (3495)...Solá (3563)...Tebbutt (*Mon. Not.* **LXIV**, 58)...]

16 54 **2696.** **Σ 700.** Fixed.

1867.30	5°8	4″54	3*n*	*Δ*
1893.09	5.4	4.43	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XII, XIII**)...H (**VII**)...Ra (**XXVIII**)...Se...Se³...*Δ* (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**)...]

17 1 **2697.** **H 364.** (= **Ku 22.**) The only later measures are:

1901.59	142°6	10″66	2*n*	Ku	9.6...9.9

[Kustner (3821)...]

17 14 **2699.** **Σ 698.** (= **Ħ IV. 101 = S 477.**) Fixed.

1866.21	345°9	31″19	3*n*	*Δ*
1889.12	345.1	31.56	1*n*	Toulouse

[Ma (*F. S.* **II**)...Ra (**XXIV**)...*Δ* (1204)...*Δ* (**I, II**)...*Annals Toulouse Obsy.* **III**...]

17 19 **2701.** **β 191.** Discovered with the 18½-inch. In DM 8.9 m. The 36-inch shows a 13 m star, 144°4 : 16″7. Later measures are:

1891.85	24°5	3″40	2*n*	β	9.1...9.1
1901.07	24.3	3.55	4*n*	Doo	

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β (3114)(*Pub. L. O.* **II**)...*Δ* (**I**)...Doolittle (*A. J.* 547)...]

17 20 **2702.** **Hn 73.** Discovered by Holden at the Washburn Observatory. Measures by Comstock.

[*Pub. Washburn Obsy.* **II, VI**...]

(See p. 1065)

17 25 **2703.** **111** *Tauri.* **S 478.** (= **Ħ V. 110 = σ 174.**) "Small star *blue.*" The change is due to proper motion of the principal star. This is given from meridian positions:

Porter	0″226	in	90°0
Bossert	0.215	in	90.0

The measures of 1839 and 1903 give 0″233.

1782.99	273°8	46″70	1*n*	Ħ
1825.06	271.3	61.76	2*n*	S
1839.94	271.5	65.70	1*n*	OΣ
1852.12	271.4	68.41	1*n*	Σ
1875.20	271.1	74.79	1*n*	OΣ
1879.07	270.7	74.84	2*n*	β
1903.78	270.4	80.61	2*n*	β

[Ra (**XXII**)...Flm...OΣ (**X**, p. 12)...β³...β⁶...]

$17^m\ 26^s$ **2704.** **Σ 699.** Fixed. Decl. in *Pos. Med.* 10′ too small.

1867.85	343°2	8″46	4*n*	*Δ*
1893.16	343.3	8.45	2*n*	Gla

[Ma (*F. S.* **I**)....Ma (**XI**)....Se....Ra (**XXX**)....Du....*Δ* (1475)....*Δ* (**II**)....Glasenapp (**II**)...]

17 33 **2705.** *Orionis* 88. **Σ 701.** (= **Ħ II. 102.**) Without change.

1867.83	142°8	5″97	4*n*	*Δ*
1893.14	141.0	5.55	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...*Δ* (**II**)...Cin⁶...Glasenapp (**II**)...Do (3378, 3799)...]

17 43 **2706.** **Wn 2.** **B. A. C. 1678.** Discovered by Winnecke with the Poulkowa Meridian Circle in 1863, but it appears to have been previously seen by Peters at Clinton. These stars have a proper motion of 0″028 in 42°9 (*A. G. Nico.*).

Since Part I of this catalogue was in type, Aitken has found that the smaller component is a very close pair (= A 847). His measures are:

B and C

1904.85	141°5	0″25	3*n*	A

There is no material change in the wider pair:

A and BC

1866.06	171°0	1″43	4*n*	*Δ*	
1889.09	168.9	1.68	3*n*	T	
1899.12	164.7	1.99	2*n*	A	6.2...6.3
1904.85	160.5	1.87	3*n*	A	

[Wn (1738)...OΣ (**X**, p. 126)...*Δ* (1475)...*Δ* (**I**, p., 377)...Cin³...LM...T (3186)...Lunt (*Mon. Not.* **LXI**, 583)...*Annals Toulouse Obsy.* **III**...A (3638)(*Pub. A. S. P.* **XVI**, 268)(*Bul. L. O.* No. 66)...]

(See No. 13055)

17 55 **2707.** **O. Stone 10.** No indication of change.

1892.13	123°6	1″12	2*n*	Collins

[Cin⁴...Lv¹...Collins (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...]

17 58 **2708.** **Hn 74.** Measures by Comstock (*Pub. Washburn Obsy.* II, VI).

18 **2709.** **Ħ I. 75.** Another observation P = 10°8 (1802.06) 1*n*. There is no pair except Σ 702 in this place. It is certainly identical with that, but error in position-angle.

18 21 **2710.** **Σ 702.** (= **Ħ I. 75.**) Probably unchanged. This is DM (2°) 943.

1867.95	80°2	7″96	3*n*	*Δ*
1879.74	76.3	8.76	1*n*	Cin
1905.03	79.6	8.40	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...*Δ* (**II**)...Cin⁶...β⁶...]

18 25 **2711.** **S 479.** B is W¹ V. 388, and C is ψ¹ *Orionis.* There is a faint star nearer A, not previously seen.

AB	1903.82	219°7	46″37	2*n*	β⁶	8.4...8.6
AC	1903.84	35.6	158.80	1*n*	β⁶	
A*a*	1903.82	279.1	14.73	2*n*	β⁶	

18^m 27^s **2712.** *η Orionis.* **Da 5.** (AC = H VI. 67 = σ 176.) Discovered by Dawes in 1848 with the 4¼-inch. There is no sensible change in the angle or the distance. This star has a proper motion of 0″023 in 272°5 (Auwers).

1872.57	87°0	0″90	8*n*	Du
1874.55	84.6	1.00	3*n*	Δ
1887.39	86.7	1.08	5*n*	Hl
1898.10	78.9	1.25	3*n*	A
1900.51	79.7	1.06	3*n*	Bryant
1903.21	83.1	1.00	3*n*	Biesbroeck

This star is also a spectroscopic binary, discovered by W. S. Adams at the Yerkes Observatory (*Astrophysical Jour.* XVII, 69).

AC	1904.97	51°0	115″14	2*n*	β

[Da (*Mon. Not.* **VIII**, 53; **XXIV**, 117)...Da^3...WJ^2...J^3...Gl...WS...Kn...Du...Hl (I II)...Sp (2133)...Sp (**II**)...Bru^2...Flm...Hd...Do (2196, 2989, 3378, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Cin^4...β^2...β^3...Δ (I)...Je (2345)...En (2678)...T (2899)...Hl (*Wash. Obsns.* 1886)...Perry (*Eng. Mech.* **XXXIX**, 11)...OΣ (**X**, p. 126)...Knorre (*Beob. Berlin*, 1892)...Ebell (3321)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 497; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...A (3584)...Doolittle (*Pub. Flower Obsy.* **I**)...Gl (*Mon. Not.* **LXI**, 556)...Biesbroeck...β^6...]

18 37 **2713.** **Σ 706.** Change doubtful.

1844.26	38°1	3″59	1*n*	Ma
1866.86	40.0	3.41	3*n*	Δ
1879.75	39.7	3.82	1*n*	Cin

[Ma (*F. S.* **I**)...H (**VII**)...Ma (**XI**)...Δ (**II**)...Cin^6...]

18 37 **2714.** **Σ 705.** Unchanged.

1867.81	11°9	18″12	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

(See p. 1065)

18 39 **2715.** **β 556.** Discovered with the 18½-inch. It is a bright star near *η Orionis*, and wanting in many of the star catalogues. In Lalande and SD 8 m.

1891.85	239°2	0″89	3*n*	β
1898.76	238.0	1.18	1*n*	β

[β (**X**)...β^1...β^3...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

18 55 **2717.** **Σ 709.** Unchanged.

1869.53	317°2	10″14	4*n*	Δ
1904.97	318.5	10.78	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

18 57 **2718.** **Σ 708.** (= **H I. 52 = S 480.**) No change.

1867.98	321°3	2″60	3*n*	Δ
1899.89	322.3	2.65	2*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Ra (**XXII**,...Δ (**II**)...T (2898)...Glasenapp (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

19 0 **2719.** **H VI. 68.** The only later measure, except an angle in Cin^6 279°7 (1879.82) 1*n*, is the following:

1901.86	281°8	135″96	2*n*	β^5	7.7...8.5

19 28 **2721.** **Ho 226.** Discovered with the 18½-inch of the Dearborn Observatory. This star has a proper motion of 0″016 in 126°9 (Battermann).

[Ho (2977, 3558)...]

(See p. 1065)

2722. **Δ 7.** Two wide pairs in the field with Σ 707, about 19^m 32^s 40^s *p*, noted by ⅃. There is no change. Not in DM. The place of A as given in Part I is from a comparison with the 6 m star, DM (34°) 1048.

AB	1903.77	328°7	21″07	2*n*	β
CD	1903.77	51.5	28.68	2*n*	β
AC	1868.08	283.0	170.95	2*n*	Δ
	1903.93	283.0	170.52	1*n*	β

The 40-inch shows a 13½ m star near C, 112°7 : 14″4

[Δ (1572)...Δ (I)...β (*Mon. Not.* **XXXIV**, 392)...β^3...β^6...]

2723. **Σ 710.** (= **S 482.**) H notes a 13 m star, 88°3 : 19 36 40″ ± (1834+). The 40-inch shows a 13.5 m star near C, 222°3 : 10″0. No change in the Σ stars.

1867.73	195°4	10″53	3*n*	Δ
1905.06	195.3	10.78	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...H (**V, VIII**)...Δ (**II**)...β^6]

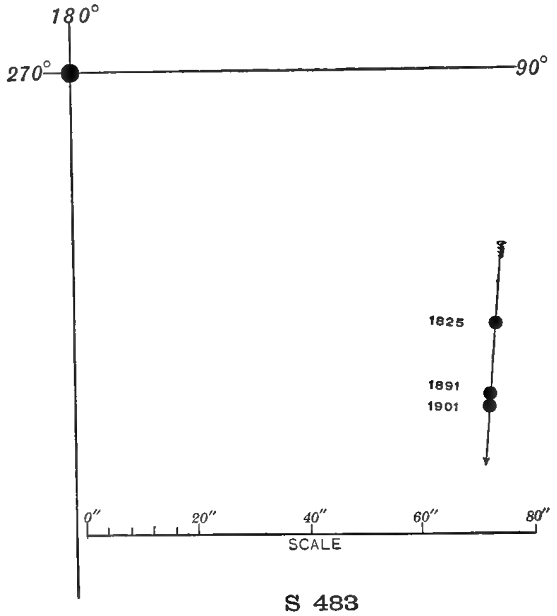
2724. **Lewis 6.** Discovered by Lewis at the Greenwich 19 38 Observatory.

1902.55	305°9	2″51	2*n*	Hu

[Lewis (*Mon. Not.* **LX**. 498)...]

2727. **S 483.** "Several stars in the field." The principal star has a considerable proper motion which is given: 20 9

Stumpe	0″192 in 204°2
Porter	0.171 in 180.0
Kustner	0.182 in 187.9



S 483

The only measures since South are:

1891.22	52°1	93″94	3*n*	Eng	6.9...8.8
1901.11	51.0	95.32	3*n*	β	7.4...8.5

It will be seen from the diagram that the direction of the proper motion given by Porter best represents the change in B. Engelhardt measures two stars more distant.

AC	1891.22	339°9	100″31	2*n*	Eng ...10.5
AD	1891.22	317.2	106.64	2*n*	Eng ...10.5

[Engelhardt (**III**)...β^5...]

$20^{m}\ 10^{s}$ **2728.** β 889. The duplicity of the principle star of Σ 707 was discovered with the 18½-inch, and the very faint companions, C and D, added with the 36-inch. The Σ components are fixed.

A and B

1891.95	223°7	0″80	3*n*	β
1898.86	229.1	0.85	1*n*	β
1898.87	227.4	1.04	2*n*	Barnard
1899.13	225.6	0.87	4*n*	Lewis
1902.87	226.7	0.95	2*n*	β

A and C

1898.85	108°0	4″09	1*n*	Barnard
1900.20	101.2	3.80	2*n*	Lewis

A and D

1898.86	105°3	11″65	1*n*	β

A and E (= Σ 707)

1873.17	131°0	18″02	2*n*	Δ
1891.95	133.3	18.22	3*n*	β
1898.86	132.0	18.26	1*n*	β

A and F

1891.90	200°2	27″85	2*n*	β
1898.86	200.3	27.84	1*n*	β

[β (**XIII**)...β3...β (*Mon. Not.* **XXXIV**, 392)...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... Barnard (   )... Δ (1979)... Δ (**II**)... Ma (*F. S.* **I**)... Ma (**XI**)... Lewis (*Mon. Not.* **LX**, 497; **LXII**, 383)...β6...]

20 10 **2729.** 115 *Tauri.* **OΣ** 107. Probably unchanged. OΣ speaks of a third star, smaller than B, in about 335°.

1867.93	307°5	9″88	3*n*	Δ
1879.06	306.5	9.93	3*n*	β
1898.83	307.4	10.37	4*n*	Hu

Hussey gives the position of the third star:

1899.07	341°1	10″00	3*n*	Hu	...12.5

[Ma (**XI**)... OΣ (**IX**)... Δ (**I**)...β1...β3... En (2678, 2742)... T (2899)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)...]

20 14 **2731.** **Σ** 712. (= **H** I. 53 = **S** 481.) There is no change. The angle given in Struve is about 10° too small.

1852.18	54°2	2″94	2*n*	Ma
1864.85	55.2	2.90	4*n*	Δ
1880.94	53.3	2.98	4*n*	Sp
1887.15	54.5	3.16	3*n*	T
1892.12	55.1	3.20	2*n*	HΣ
1903.19	54.3	2.93	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII, XV**)... Δ (1473)... Δ (**II**)... WS... Pl... Sk ... Do (2196, 2316) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Flm... Sp (**II**)... T (2898)... Cin6... Glasenapp (**II**)... Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)... Sk5... Biesbroeck...]

20 26 **2734.** 114 *Tauri.* **H** 365. (AC = **H** V. 115 = σ 178.) The large star is given a proper motion of 0″016 in 291°4 (*A. G. Berlin*). The measures show no motion.

A and B

1877.87	346°9	37″80	1*n*	β	
1903.78	348.5	37.66	2*n*	β	...11.4

A and C

1783.74	192°1	51″57	1*n*	H	
1877.87	193.9	58.82	1*n*	β	
1903.78	193.1	58.79	2*n*	β	...11.5

A and D

1877.87	279°6	74″29	1*n*	β	
1903.78	279.2	74.18	2*n*	β	...11.4

[β1...β6... Innes (*Mon. Not.* **LXI**, 416)...]

2735. ψ² *Orionis.* **Knott** 3. Discovered by George Knott in 1863. No material change since the first measures. Auwers gives the proper motion of the bright star, 0″016 in 248°2. This is a spectroscopic binary, discovered by Frost at the Yerkes Observatory (*Astrophysical Jour.* XVII, 427). $20^{m}\ 33^{s}$

1876.12	324°4	2″66	3*n*	Δ	5.3...9.0
1899.53	323.4	2.80	2*n*	A	...9.0

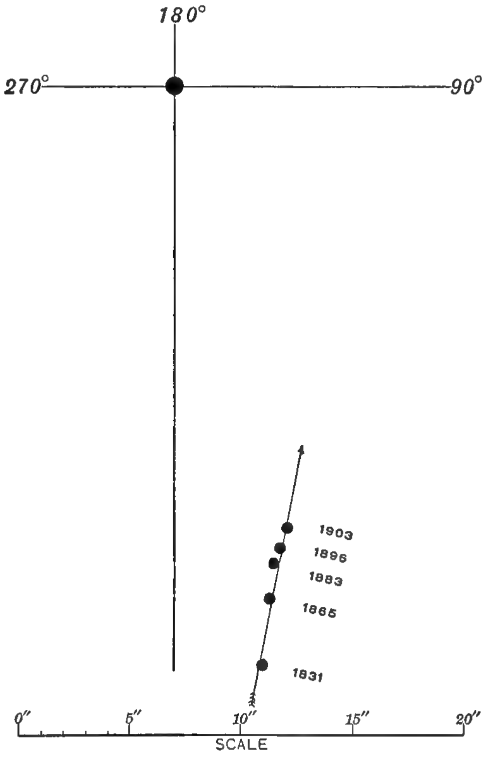
[Kn... Da4... Δ (**I**)... T (2899)... Coleman (*Mem. R. A. S.* **LIV**)... A (3638)...]

2736. **Σ** 713. Identified as given in Part I. No change since Struve. 20 45

1847.60	30°7	3″06	3*n*	Ma
1870.05	31.9	3.09	3*n*	Δ
1901.85	30.6	3.05	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... Δ (**II**)... HΣ (**XII**)...β5...]

2738. **Σ** 704. The apparent motion of the companion is 0″07 annually. The minimum distance will be about 7″. 20 48



Σ 704

1831.31	8°5	26″53	2*n*	Σ
1865.50	10.4	23.74	5*n*	Δ
1883.56	11.5	22.74	5*n*	En
1896.30	12.8	21.58	3*n*	A
1903.75	14.2	20.86	3*n*	β

[Ma (*F. S.* **II**)... H (**IV**)... Flm... Δ (1572)... Δ (**II**)... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)... En (2663)... A (3395)...β6...]

20^m 48^s **2739.** **H 3759.** Measures from H^3, magnitudes, 6...9. B is L 10253. Magnitudes in Lalande, 6½...9.

1877.08	317°4	27″95	2*n*	Cin	6.5...8.0
1893.97	318.0	27.35	1*n*	Scott	

[Cin^4...Scott (*Brit. Ast. Ass'n* **VI**, 248)...]

20 49 **2740.** **β 890.** Discovered with the 18½-inch. Thus far there is no evidence of motion.

1891.89	285°3	1″08	2*n*	β
1901.57	285.1	1.37	2*n*	Ku

[β (**XIII**)...β^3...β (3114) (*Pub. L. O.* **II**)...Kustner (3821)...]

20 57 **2741.** **β 1318.** The wide pair is noted in *A. G. Lund*, and in measuring that with the 40-inch the nearer star was found. No other measures.

[β^6...]

21 15 **2744.** **β 319.** Discovered with the 6-inch. It is near β *Leporis*. The change, if any, is small.

1877.11	228°1	3″80	2*n*	Cin	7.7...10.0
1879.13	226.6	3.72	1*n*	β	7.8...11.5
1891.06	229.7	4.29	2*n*	Hl	
1898.14	227.7	4.26	1*n*	See	

[β (**VI**)...β (2062)...β^3...Cin^4...Hl (**I**, **II**)...See (   )...]

21 38 **2745.** **Σ 711.** No change. In 1864 Dembowski suspected a third closer star. Both stars round, and no other companion with the 36-inch, 1890. The principal star has a large proper motion, and the companion is moving with it.

Porter	0″434	in	200°9
Kustner	0.425	in	198.3

There is no relative change:

1866.91	233°0	8″75	4*n*	Δ
1904.97	231.8	8.77	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Bl (**V**)...β (3048) (*Pub. L. O.* **II**)...β^6...]

21 45 **2748.** **Σ 715.** Very little, if any, change.

1867.77	200°6	0″91	4*n*	Δ
1895.25	200.5	0.83	2*n*	HΣ

[Ma (*F. S.* **II**)..Ma (**XI**)...OΣ (**IX**)...Flm...Δ (**II**)...Sk^3...Big...HΣ (**XII**)...]

21 46 **2750.** **S 484.** Declination in South about 4′ too large. The only measures since 1825 are:

1901.11	170°0	59″00	3*n*	β^5	8.4...8.4

21 53 **2751.** 118 *Tauri*. **Σ 716.** (= **H II. 75** = **Sh 55.**) No material change since the measures of H in 1783. The components have a common proper motion of 0″019 in 163°2 (Auwers).

1868.98	198°7	4″71	4*n*	Δ
1881.39	199.9	5.01	9*n*	Hl
1903.20	201.7	4.86	3*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI**, **XIII**, **XV**)...Ba (**I**, **II**)...Da^1...Bp...P^1...Lu (1103)...Lu (**I**, **II**, **III**)...Bes...Wr...Wr (*Phil. Trans.* 1851)...Auwers (1393)...Ek (**III**)...K...K (409)...Se...Se^3...J^3...Ra (**XXII**)...Δ (1015, 1036)...Δ (*Mem. Accad. Sci.*)...Δ (**I**, **II**)...Gl...WS...WS^2...Du...Flm...Je (2345)...Sp (**II**)...Franz (2590)...Pt...Sk^2...Hayn (3051)...Hl (*Wash. Obsns.* 1885–86)...Hl (**I**, **II**)...Knorre (*Beob. Berlin* 1892)...Big...Maw (**I**)...Jones (*Haverford Coll. Obsy. Pub.* 1892)...Glasenapp (**II**)...Cohn (3240)...Collins (*A. J.* 378)...Knorre (3300, 3518)...Solá (3563)...Coleman (*Mem. R. A. S.* **LIII**)...Do (3680, 3980)...*Annals Toulouse Obsy.* **III**...Thiele (3837)...Sk^5...Biesbroeck...]

2753. **Hn 75.** Discovered at the Washburn Observatory. Measures by Comstock (*Pub. Washburn Obsy*, II, VI). 21^m 55^s

2755. **Σ 695.** Unchanged since Struve. 22 10

A and B

1867.56	156°5	10″23	3*n*	Δ
1904.93	158.1	10.24	1*n*	β

B and C

1867.56	170°8	1″99	2*n*	Δ
1904.93	172.7	2.30	1*n*	β

[Ma (*F. S.* **I**, pp. 22, 47)...Ma (**XI**)...Δ (**II**)...β^6...]

2756. **OΣ 108.** Fixed. The angle in OΣ seems to be too large. 22 18

1868.01	132°9	3″43	3*n*	Δ
1880.16	133.7	3.24	1*n*	β
1890.15	132.8	3.44	2*n*	T
1898.80	132.0	3.63	4*n*	Hu

[OΣ (**IX**)...Δ (**I**)...β^3...T (3186)...Flm...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

2757. **OΣ (App) 63.** Without change. 22 23

1904.23	274°3	74″89	3*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

2758. **Σ 719.** (AC = **H IV. 110** = **S 485.**) No change in C, and very little, if any, in the close pair. 22 27

A and B

1858.72	329°9	0″99	2*n*	OΣ
1870.28	330.3	1.02	5*n*	Δ
1886.21	331.1	0.97	2*n*	Hl
1889.09	334.6	1.03	1*n*	β
1900.17	328.1	0.93	2*n*	Lewis
1903.29	329.0	1.17	4*n*	Gr. Obsy.

A and C

1867.12	351°0	15″07	3*n*	Δ
1889.10	351.4	15.16	1*n*	β
1902.71	350.4	15.26	3*n*	Lewis

[Ma (*F. S.* **I**)...OΣ (**IX**)...Da^3...Bp...Δ (1204)...Δ (**I**, **II**)...Ba (**II**, **IV**)...Pl...Flm...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Sk^3...β (2929) (*Pub. L. O.* **II**)....Greenwich Obsy. (*Mon. Not.* **LX**, 498; **LXI**, 486; **LXIII**, 403; **LXIV**, 792)...HΣ (**XII**)...]

2759. **See 53.** Cogshall in 1899 could not see this star double. 22 29

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

22^m 32^s **2760.** **H 2267.** Identified and measured. There is a third star, more distant, in 291°.

1904.74	111°.1	24″.99	2*n*	β^6	8.2...11.9

22 41 **2762.** **H 702.** Identified as SD (2°) 1258. The R. A. in Part I is 32ˢ too large.

1904.74	148°.3	24″.15	2*n*	β^6	8.3...8.6

22 48 **2763.** **β 891.** (AC = **H 3275** = **OΣ (App) 64.**) The small star was detected with the 18½-inch. H has no measure of AC. C is W² V. 617. The distance between A and C is slowly increasing. The meridian positions of 1825 make the distance 51″.0 at that time.

A and B

1891.98	126°.7	10″.66	3*n*	β	8.0...12.5
1898.85	122.2	10.66	2*n*	β	7.5...12.7

A and C (= H 3275)

1875.31	20°.6	52″.86	3*n*	Δ	7.2... 7.7
1891.98	21.0	53.10	3*n*	β	8.0... 8.1
1892.56	21.0	53.27	4*n*	Franz	7.4... 7.8
1898.45	20.7	53.54	2*n*	β	... 7.6

[β (**XIII**)...β³...β (3114) (*Pub. L. O.* **II**) (*Pub. Y O.* **I**) ... Δ (**I**, p. 246)...Franz (3464)...]

22 50 **2764.** **H 701.** "Large star *very red.*" In DM 7.1 m. In 1876 I found the companion brighter than given in H; well seen with the 6-inch. The only measures are:

1901.79	137°.0	35″.26	2*n*	β^5	7.2...10.9

22 57 **2765.** **H 2268.** (= **Σ 722** *rej.*) "Fine; in diffused nebulosity." Piazzi Vʰ. 109. Probably unchanged.

1879.95	300°.1	26″.03	2*n*	β	7.0...9.6
1888.09	301.6	26.08	2*n*	T	
1904.74	300.3	25.92	2*n*	β	

[Ra (**XXIII**)...β³...T (2991)...β⁶...]

22 58 **2766.** **Da 6.** Discovered by Dawes in 1854. "Both *pale yellow.*" No material change.

1875.78	84°.4	0″.69	3*n*	Δ
1890.19	89.7	0.85	2*n*	T

[Da³... Da (*Mon. Not.* **XXIV**, 117)... Δ (**I**)... Hd... Cin⁴...Wilson (Cin¹⁰)... T (3186)...]

23 5 **2767.** **Webb.** Variable star discovered by Webb in 1874. It is rather reddish, and has a period of about 412 days. These stars are SD (4°) 1146 and 1145.

1879.14	227°.4	46″.70	2*n*	β	8.0...9.2
1901.80	228.6	46.87	2*n*	β	

[Webb (*Mon. Not.* **XXXI**, 84; **XXXII**, 89)...β³...β⁵...]

23 5 **2768.** **Δ 8.** The closer of these faint pairs was measured by Se, and called Σ 731. A and C are respectively SD (2°) 1264 and 1261.

AB	1857.1	47°.0	5″.52	1*n*	Se	
	1882.20	50.2	5.71	1*n*	β	8.7...9.5
	1904.11	49.7	5.46	3*n*	β	
CD	1882.20	359.1	16.03	1*n*	β	9.0...9.8
	1903.81	357.7	16.18	2*n*	β	
AC	1903.81	291.6	102.22	2*n*	β	

[Δ (**I**)...β (*Liverpool Ast. Soc. Proc.* **I**, 31)... Espin (*Eng. Mech.* **XXXVI**, 471) ...Se...β⁶...]

2769. **β** *Leporis.* **β 320.** (AC = **H 3761.**) Discovered with the 6-inch. Dembowski's first position-angle is shown by the subsequent measures to be too small. The change, if any, is very slow, but the companion has the same proper motion as the bright star, 0″.086 in 189°.4 (Auwers). 23^m 6^s

A few of the measures are:

A and B

1876.96	290°.7	2″.98	4*n*	Δ
1877.46	282.5	3.12	7*n*	Hl
1877.76	294.4	3.01	3*n*	Δ
1878.35	293.1	3.07	3*n*	Δ
1879.10	286.3	2.74	1*n*	Cin
1879.18	285.0	2.88	8*n*	Sp
1879.47	284.6	2.54	7*n*	β
1882.68	287.0	3.03	8*n*	Sp
1889.02	292.5	2.79	3*n*	T
1891.12	282.1	2.89	2*n*	Hl
1898.12	295.7	2.72	3*n*	A

Two distant stars are:

1879.88	75°.0	206″.36	1*n*	β	...10
1879.88	57.6	241.53	1*n*	β	...10

[β (**VI**)...β (2020, 2062)...β²...β³... Δ (**I**)... Δ (2195)... Hl (2295, 2430) (**I**, **II**) (*Wash. Obsns.* 1880, 1882)... Cin⁴... Cin⁵... Cin⁶... Pt... Russell (*Sidney Obsns.* 1871–81)... Lv¹... T (2991)... Sp (**II**)... Sp (2133)... See (3495)... A (3584)...]

2770. *Aurigae* **96.** **Σ 718.** Without change. 23 7

1866.78	74°.8	7″.72	3*n*	Δ
1899.88	76.0	7.69	1*n*	Espin

[Ma (*F. S.* **I**)...Se...Wr...Ra (**XXIII**)...Δ (1204)...Δ (**I**, **II**)...Bl (**V**)...Espin (*Mon. Not.* **LXIV**, 676)...]

2771. **β 557.** (AB = **H IV. 45** = **Sh 57** = **Σ 721.**) Discovered with the 18½-inch. There is no change in the Struve star. All the later measures of the close pair are given. 23 16

B and C

1878.16	142°.4	0″.46	2*n*	β	9.5...9.5
1890.80	153.2	0.3±	6*n*	Sp	
1890.90	147.3	0.36	3*n*	β	9.0...9.0
1895.46	152.2	0.4±	3*n*	Sp	
1899.36	148.9	0.36	2*n*	A	9.0...9.0

A few of the measures of the wide pair are:

A and BC (= Σ 721)

1783.72	152°.4	20″.05	1*n*	H
1868.65	149.7	24.57	4*n*	Δ
1890.91	149.8	24.61	2*n*	β
1898.93	149.3	24.68	2*n*	A

[β (**X**)...β¹...β (3048) (*Pub. L. O.* **II**)...Sp (**III**)...A (3638)...Ma (*F. S.* **II**)... En...Glasenapp (**II**)...]

23m 28s **2773.** **β** 1239. (ABC = **H** 367.) Herschel's description of the wide triple is: "One of the most curious objects in the heavens. It is a triple star forming an equilateral triangle, and placed exactly in the center of a small circular nebula, which extends a little beyond the stars on all sides, surrounding them like an atmosphere." The second star of this triangle, in order of magnitude, was found to be double with the 36-inch. The small star is extremely faint. The only previous measures of the Herschel stars which I have been able to find were made with one of the reflectors of Lord Rosse's Observatory. They are evidently only approximate, and no change can be inferred from the differences in distance. The 36-inch shows another faint star 14 m, 13″6 from A in the direction of 18°7 The later measures are:

B and D

1899.92	320°1	2″36	2*n*	A	...13.5

A and B (= H 367)

1873.77	239°2	7″1	1*n*	Rosse	
1891.77	233.8	8.00	3*n*	*β*	9.5... 9.9
1899.52	232.2	7.96	2*n*	A	9.5...10.5
1902.90	233.9	8.02	2*n*	*β*	

A and C (= H 367)

1873.77	310°5	9″7	1*n*	Rosse	
1891.77	310.1	10.53	3*n*	*β*	...11.2
1899.52	309.6	10.14	2*n*	A	...11.0
1902.90	308.3	10.60	2*n*	*β*	

A and E

1899.11	16°8	14″76	1*n*	A	...12.5

[*β* (**XVIII**)....*β* (*Mon. Not.* **LII**, 454)....*β* (3141) (*Pub. L. O.* **II**, pp. 178, 224).... A (3638)...*β*6...]

23 37 **2774.** **H** V. 101. The only observation since 1783 is:

1901.41	117°1	48″26	3*n*	*β*5	7...10

23 37 **2775.** 31 *Orionis.* **Σ** 725. Fixed. The large star is given a proper motion of 0″031 in 236°3 (*A. G. Nico.*).

1868.00	87°7	12″61	4*n*	Δ
1887.93	88.0	12.48	2*n*	T

[Ma (*F. S.* I)... Ma (**XI, XIII**)...Gl...WS2...Δ (**II**)...T (2898)...*β*3...Cin5... Wilson (Cin 10)...]

23 38 **2776.** **Σ** 724. Unchanged. H calls B "*very red.*"

1869.45	245°9	6″80	4*n*	Δ
1894.18	246.3	7.05	2*n*	HΣ

[H (**VII**) .... Ma (*F. S.* I) .... Ma (**XI**) .... Δ (**II**) .... *A. G. Leipzig*, p. 207 .... HΣ (**XII**)...]

23 47 **2777.** **H** 703. Examined, thinking it might be the same as H 702 with an error of 1m in one or the other, but found to be distinct pairs. In DM 8.3 m.

2778. **Hd** 69. (= **Hd** 71.) Hd 71 is given 2m *f* and 2′ *s* of this, but there is nothing in that place. The two are certainly identical. 23m 57s

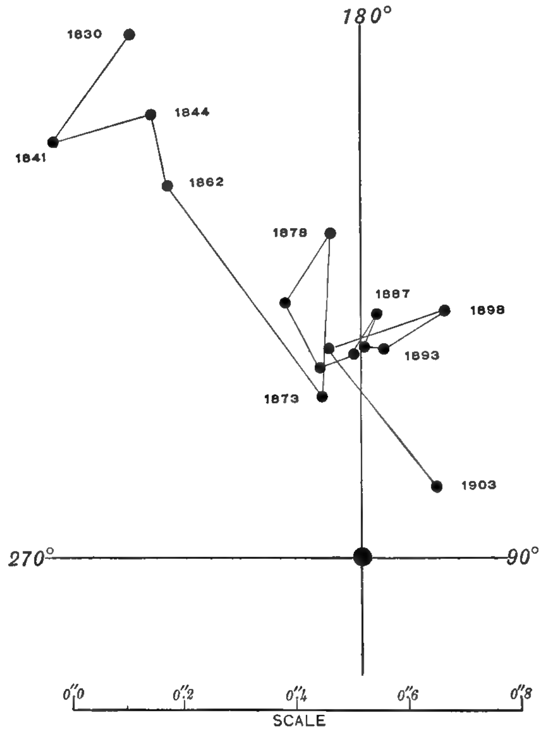
1901.98	43°7	12″73	2*n*	*β*5	9.0...12.2
1904.06	43.9	12.88	2*n*	*β*6	

2779. *Orionis* 116. **Σ** 726. Unchanged. 24 14

1868.08	257°7	1″07	3*n*	Δ
1887.96	258.9	1.18	2*n*	T

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...T (2898)...]

2780. 32 *Orionis.* **Σ** 728. (= **H** I. 25 = **Sh** 56.) Binary, but the measures, even the best of them, are very conflicting, and give no indication as to the form of the apparent orbit. The system has a proper motion of 0″071 in 168°0 (Bossert). 24 22



32 Orionis. Σ 728

1782.05	217°8	....	1*n*	H
1830.96	203.7	1″04	4*n*	Σ
1841.56	216.3	0.94	3*n*	OΣ
1844.94	205.1	0.89	3*n*	Da
1862.20	207.4	0.76	2*n*	OΣ
1863.33	192.2	Cun.	5*n*	Δ
1873.41	193.6	0.3±	5*n*	Du
1874.18	181.9	Cun.	1*n*	Δ
1878.45	185.2	0.59	1*n*	OΣ
1878.51	196.6	0.48	2*n*	*β*
1882.93	192.1	0.35	8*n*	En
1882.94	182.1	0.37	4*n*	Sp
1887.17	176.4	0.44	6*n*	Sp

1889.03	179°2	0″38	3*n*	β
1893.01	174.1	0.38±	5*n*	HΣ
1897.97	161.5	0.22	2*n*	Hu
1898.01	161.2	0.25	3*n*	A
1900.17	188.8	0.38	2*n*	Bryant
1903.90	135.3	0.19	1*n*	A

[Ma (*F. S.* I)...Ma (**IX, XI, XIII, XV**)...H^1...H (**V**)...Bp...WJ^2...Se...Se^3 ...Burton (*Mon. Not.* **XXXIV**, 125)...Da^3...Gl...Du...Flm...Do (2196)... (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (2132)...Sp (**II**)...Sp (**II**, App.)... β^1....β^3....β (2929)(*Pub. L. O.* **II**)....Sk....Hd....OΣ (**IX**)(**X**, p. 153).... Δ (1473)... Δ (**II**)...T (2898, 2991)... En (2663)... Glasenapp (**II**)... Hu (*A. J.* 427)... Lewis (*Mon. Not.* **LIX**, 400; **LXI**, 486)... Solá (3563)... A (3584)... HΣ (**XII**)...Biesbroeck...]

(See p. 1065)

24^m 51^s **2781.** **Σ 714.** Apparently unchanged.

1867.25	326°3	9″86	3*n*	Δ
1904.97	326.4	9.86	2*n*	β

[H (**V**)...Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^6...]

24 57 **2783.** 33 *Orionis.* **Σ 729.** (= **H I. 22 = Sh 59.**) Relatively fixed, but common proper motion of 0″024 in 268°8 (Auwers).

1867.02	28°3	1″76	3*n*	Δ
1878.49	27.1	1.92	3*n*	Sp
1903.21	26.9	1.91	2*n*	Biesbroeck

[Ma (*F. S.* I)....Ma (**XI**)....Se...En (1673)...H^2...Da^2...WJ^2...Ra (**XXII**)... Δ (1118)... Δ (**I, II**)...OΣ (**IX**)...Du...Sp (**II**)...T (2991)...Glasenapp (**II**)... Knorre (3518)... Scott (*Mon. Not.* **LIX**, 427)... Maw (**III**)... Coleman (*Mem. R. A. S.* **LIII**)...Biesbroeck...]

25 : **2785.** **Hd 70.** The observers at the Kirkwood Observatory could not find any pair of this kind in or near the place given in Hd.

25 3 **2786.** **Σ 723.** Fixed. The principal star is given a proper motion of 0″03 in 360° (*A. G. Harvard*).

1869.13	104°7	4″38	5*n*	Δ
1904.97	103.8	4.37	2*n*	β

[H (**V**)...Ma (*F. S.* I)...Ma (**XIII**)...Δ (**II**)...β^6...]

25 4 **2787.** **Σ 727.** Without change.

1867.17	59°8	2″05	3*n*	Δ
1900.73	59.0	1.65	2*n*	Sk

[Ma (*F. S.* I)...Ma (**XI, XIII**)...H (**V**)...Du...WS^2...Gl...Sk^2... Δ (**II**)... Collins (*A. J.* 378)...Knorre (3300, 3518)...Ebell (3321)...Sk^5...]

25 8 **2788.** **Σ 732** *rej.* From *Catalogus Novus.* The only measures are:

1903.96	251°9	44″68	2*n*	β^6	8.7...9.0

(See p. 1065)

25 17 **2789.** **Σ 730.** (= **H III. 93 = H N. 124 = Sh 58.**) Fixed.

1865.86	141°1	9″62	3*n*	Δ
1889.96	140.2	9.53	4*n*	Giacomelli

[Ma (*F. S.* I)...Ma (**XI**)...WJ^2...J^3... Se...Wr... Δ (1204)... Δ (**I, II**)... Giacomelli (**I**)...Glasenapp (**II**)...]

25^m 18^s **2790.** **Σ 731.** No sensible change. The measure in Se credited to this pair belongs to a faint pair nearly 2^m *p.* (See No. 2768.)

1869.34	328°0	4″58	4*n*	Δ
1904.74	328.4	4.65	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β (2033)...β^6...]

25 18 **2791.** **Ho 335.** Discovered at the Dearborn Observatory by Ho (3223). (See p. 1065)

25 21 **2792.** **Σ 720.** Fixed.

1866.53	166°9	5″98	3*n*	Δ
1904.97	166.2	6.28	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^6...]

25 25 **2793.** **Sh 61.** Both stars in *A. G. Albany.* The only measures since 1822 are the following:

1879.04	352°0	66″86	1*n*	β^3	8.0...8.5
1901.82	352.8	67.08	2*n*	β^5	8.1...8.5

25 38: **2795.** **Hd 71.** Nothing in this place. It is identical with Hd 69. (See No. 2778.)

25 52 **2796.** δ *Orionis.* **β 558.** (AC = **H V. 10 = Sh 60 = Σ 14, App. I.**) The faint companion was detected with the 18½-inch. The proper motion of δ *Orionis* is 0″022 in the direction of 288°4 (Auwers). These small stars can be only optical companions.

The large star is a spectroscopic binary, discovered by Deslandres (*C. R.* 130, 379).

A and B

1892.06	226°8	32″40	3*n*	β
1898.84	226.5	32.35	2*n*	β

A and C

1781.90	358°2	52″97	1*n*	H
1863.05	359.2	52.48	5*n*	En
1870.05	359.3	52.49	5*n*	Δ
1879.08	360.3	52.62	2*n*	β
1898.84	359.3	52.56	2*n*	β

[β (**X**)...β^1...β^3...β (3141)(*Pub. L. O.* **II**) (*Pub. Y. O.* I)...Δ (**II**)...Ra (**XXIII, XXXI, XXXVIII, XXXIX**)...Se...Se^3...En...Je (2329)...Glasenapp (**II**)...]

26 18 **2800.** **A. G. 95.** Double in *A. G. Lund.* Measures by β^6.

26 28 **2802.** **Engelmann.** "Nova" from Engelmann. These stars are SD (6°) 1212 and 1211. The only other measures are:

1901.85	251°2	44″87	2*n*	β	8.6...8.9

[En...β^5...]

26 34 **2803.** **Σ 733.** No material change.

1868.09	40°0	12″26	3*n*	Δ
1905.09	39.3	12.67	1*n*	β

[Ma (*F. S.* I)...Ma (**XI, XII**)...Gl...Δ (**II**)...β^6...]

26^{m} 37^{s} **2804.** **β 1048.** (= **Hd** 73.) Discovered with the 36-inch, but previously seen by the Harvard observers. A naked-eye star in *Orion;* 6 m in DM and Heis; Gould, 6½. No proper motion in *Greenwich 10-Year Catalogue.* The following are the later measures:

1898.20	354°6	2″22	3*n*	A
1901.05	352.8	2.33	3*n*	Doo

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...Hd...A (3584)...Doolittle (*A. J.* 547)...]

26 49 **2805.** **A. G. 96.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

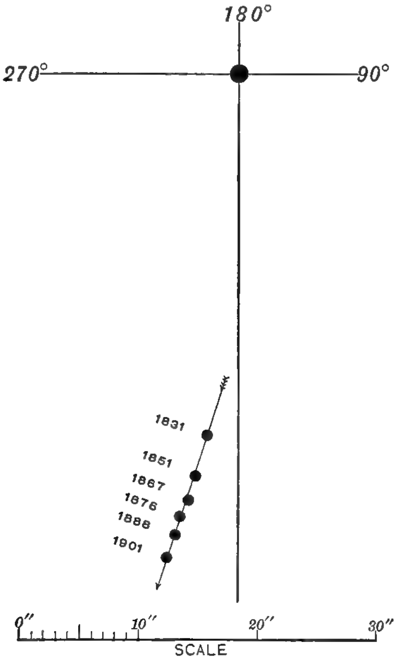
27 : **2806.** **H. C. Wilson 3.** There is no pair of this kind here, or in the vicinity. It should be in the field with β 1049. With a large error in the position-angle, it might be identical with β 1048.

[Wilson (Cin 10)...β 6...]

27 2 **2807.** **Σ 735.** The change is due to proper motion. The measures of 1831 and 1901 give for the motion of B, 0″151 in 342°4. As the components are of nearly the same magnitude, the proper motion may belong to either.

1831.15	355°2	30″92	2*n*	Σ
1851.20	354.2	34.51	1*n*	Ma
1867.60	353.7	36.66	3*n*	Δ
1876.10	352.7	37.91	2*n*	Hl
1888.19	352.4	39.57	2*n*	Hl
1901.98	351.9	41.57	2*n*	β

[Ma (*F. S.* **II**)...Ma (**XIII**)...En...Δ (1735)...Δ (**II**)...Flm...Sk...Hl (**I**, **II**)...Wilson (Cin 10)...Doolittle (*Pub. Flower Obsy.* **I**)...β 5...]



Σ 735

27^{m} 3^{s} **2808.** **β 1049.** (ABC = **Σ** 734; AC = **H V. 119.**) The duplicity of C was discovered with the 36-inch. The change is not very pronounced. In appearance it is an interesting quadruple, but there has been no change of the Herschel and Struve companions with respect to A. All the later measures of CD are:

C and D

1888.91	296°1	0″76	4*n*	β
1890.20	297.7	0.73	2*n*	T
1891.16	297.2	0.5±	1*n*	Sp
1895.11	291.8	0.6±	4*n*	Sp
1898.73	294.7	0.65	4*n*	A
1898.88	294.2	0.58	1*n*	β
1900.89	297.6	0.68	2*n*	Doo

A and B (= Σ 734)

1867.76	353°8	1″65	3*n*	Δ
1888.91	355.2	1.61	4*n*	β
1890.80	355.6	1.60	5*n*	Sp
1895.11	354.3	1.59	4*n*	Sp
1898.20	352.2	1.92	3*n*	A

A and C (= H V. 119)

1783.76	248°4	30″20	1*n*	H
1867.76	242.9	29.36	3*n*	Δ
1879.02	242.8	29.47	2*n*	β
1881.91	242.8	29.42	3*n*	β
1894.16	243.2	29.25	2*n*	Sp

[β (**XV**)...β (2929)...β 3...β (*Pub. L. O.* **II**)...Sp (**III**)...T (3185, 3186)...Ma (*F. S.* **I**)...Δ (**II**)...LM...Lv...Wilson (Cin 10)...Hd...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*A. J.* 547)...A (3584)...]

2810. **A. G. 97.** Double in *A. G. Leiden.* Measures by β 6. 27 19

2811. **A. G. 98.** Noted "obl.?" in *A. G. Lund.* No appearance of being double with the 40-inch, 1902.80. 27 21

2812. **β 1267.** Discovered with the 36-inch in the course of measures of *Nova Aurigae.* The measures appear to indicate some retrograde motion. 27 22

1892.13	217°9	0″84	3*n*	β
1894.16	216.9	0.82	2*n*	Sp
1896.11	215.2	0.86	4*n*	Sp
1900.83	214.9	0.76	2*n*	A

[β (**XIX**)...β (3141)(*Pub. L. O.* **II**)...Sp (**III**)...A (*Bul. L. O.* No. 11)...]

2813. *a Leporis.* **H 3766.** This star has a proper motion of 0″018 in 302°5 (Auwers). 27 24

1877.95	154°8	36″02	1*n*	β
1883.92	156.0	35.40	1*n*	Wilson
1905.11	156.4	35.66	1*n*	β

[Cin 4...Wilson (Cin 10)...β 1...β 6...]

2814. **See 54.** The later measures make the distance less. 27 28

1899.80	269°2	13″27	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

27m 43s **2815.** **Tucker.** Noted as double by Tucker with the Meridian Circle at Mt. Hamilton. Measures by Aitken (*Bul. L. O.* No. 11).

27 52 **2816.** **OΣ 109.** No change.

1868.36	128°4	10″70	4*n*	Δ
1898.81	129.5	10.88	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Ba (**I**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

27 58 **2817.** 38 *Orionis.* **OΣ 110** *rej.* At first an elongation suspected by OΣ, but it was excluded as single in the *Pulkowa Catalogue* of 1850. Ma has four observations, 19°2 : 0″2 (1843.2) 3*n*, and 18°4 : 0″25 (1852.2) 1*n*. Always single to ⅃ 1866–67. No elongation, 1873, on a good night with 6-inch, and Hussey found it perfectly round with the 36-inch in 1899. It is probably not double.

[Ma (**XI, XIII**)...Δ (**I**, p. 227)...Hu (*Pub. L. O.* **V**)...]

27 58 **2818.** **♅ V. 118.** (= **Hd** 74.) In Hd given as a wide pair, suspected to be triple. The only measures are:

1901.80	263°5	27″54	2*n*	β^5	7.1...10.7

28 16 **2819.** **Bond.** No. 294 of Bond's *Catalogue of Stars* about the nebula of Orion, marked "double." Examined with the 40-inch, and found to be only a wide pair of 11 m stars, 251°5 : 32″8, in the field *sp* a 7½ m star.

28 26 **2820.** **Σ 737.** (= **H** 368.) Unchanged. In the cluster M 36.

1866.19	305°1	10″79	3*n*	Δ
1904.97	304.6	10.63	2*n*	β

[Ma (*F. S.* **I**)...H (**VII**)...Ma (**XIII**)...Δ (**II**)...β^6...]

28 32 **2821.** λ *Orionis.* **Σ 738.** (= **♅ II. 9** = **Sh** 62.) Σ speaks of a third star 12 m, 184° : 27″. The measures given are by Se, but the distance is printed, 23″16. Sadler (*Eng. Mech.* XLII, 379) finds that the measure was wrongly reduced, and should be as given in Part I. The later measures of AB make the angle smaller, but do not show any motion, leading to the inference that Σ's angle is too small. This view is supported by ♅'s angle of 44°8 (1799.88) 1*n*, from all of which it would appear that the components are relatively fixed, but have a common proper motion of 0″028 in 230°9 (Auwers). For the distant star we have:

1880.68	183°1	28″66	4*n*	β
1905.04	182.6	28.35	2*n*	β

Some of the later measures of AB are:

1866.29	44°8	4″34	4*n*	Δ
1876.17	43.8	4.57	4*n*	Hl
1879.30	42.9	4.36	7*n*	Je
1880.51	44.9	4.27	2*n*	β
1885.16	47.4	4.34	3*n*	Hl
1888.19	44.0	4.44	4*n*	Hl

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**)...Wr... Se... Se^3...Bes...Ba (**II, IV**)...H (**VII**)...Lu (**I, II, III**)...Lu (1103)...Wh...K (409)...WJ...K...Ra (**XXII**) ...*Durham Obsns.* 1846–48...Auwers (1393)...Δ (1118)...Δ (**I, II**)...Da^1... Bp...P^1...Hl (*Wash. Obsns.* 1876, 1885)...Hl (**I, II**)...Du...Pk...Je (2345) ...Franz (2590)...β^3... Giacomelli (**I**)...Wellman (*Beob. Berlin* 1892)...**T** (3185)...Glasenapp (**II, III**)...Cohn (3240)... Ebell (3321)... Knorre (3518)... Coleman (*Mem. R. A. S.* **LIII**)... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**)... β^6...]

2822. **H** 3770. "Extremely delicate; a fine object." Apparently without change. 28m 33s

1881.85	18°0	4″10	2*n*	β	8 ...12
1903.96	18.8	4.00	3*n*	β	8.0...11.5

[Innes (*Mon. Not.* **LXIV**, 131)...β^3 (p. 326)...β^6...]

2823. **β 13.** Discovered with the 6-inch. In a low-power field with Σ 743. No sensible change. 28 36

1892.00	131°6	1″10	3*n*	β
1900.78	129.9	1.21	3*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**) ... Δ (**I**)...Cin^5... Doolittle (*Pub. Flower Obsy.* **I**)...]

2824. **Hn 76.** Discovered by Holden at the Washburn Observatory. The nearest star B was added by Comstock. The only later measures are: 28 36

AB	1904.84	236°2	2″15	2*n*	β
AC	1904.84	214.9	3.24	2*n*	β

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)(*Sid. Mess.* **IX**, 78)...β^6...]

2825. **OΣ 111.** Unchanged. The principal star is the variable *T Orionis* of Gore's *Catalogue of Variable Stars.* He finds a variation of half a magnitude. *T Orionis* of Chandler is a different star. 28 36

1870.04	353°2	2″76	5*n*	Δ
1898.33	351.3	2.88	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

2826. **Σ 736.** There may be a little change in angle. 28 36

1844.26	344°2	2″40	1*n*	Ma
1866.54	348.6	2.04	3*n*	Δ
1895.25	349.4	2.19	2*n*	HΣ
1896.26	350.2	2.58	2*n*	A
1904.97	352.2	2.31	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...A (3395)...HΣ (**XII**)...β^6....]

2828. **Σ 743.** No material change. 28 47

1868.11	280°0	1″86	4*n*	Δ
1887.12	276.8	1.78	5*n*	T

[Ma (*F. S.* **I**)... Ma (**XI**) ... Se ... Se^3... Δ (1204) ... Δ (**II**) ... Cin^5... Cin^6... T (2898)...]

2829. **Σ 741.** (= **♅ III. 76.**) Fixed. 28 48

1868.54	285°4	10″00	4*n*	Δ
1879.79	285.7	9.98	1*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Cin^6...]

$28^m 57^s$ **2830.** Σ 745. (= ♅ III. 13.) Fixed.

1869.33	346°4	28″76	4*n*	Δ
1880.01	346.3	28.74	2*n*	β

[Ma (*F. S.* **II**)...H²...En...Δ (**II**)...β³...]

29 2 **2832.** Σ 744. Fixed.

1867.26	265°9	12″66	3*n*	Δ
1905.04	266.2	12.89	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Δ (**II**)...β⁶...]

29 10 **2833.** *Orionis* 133. Σ 747. (= ♅ III. 14 = **S** 489 = Σ 15, **App. I.**) Without change. Not in Heis as a naked-eye star. The two stars are L 10529, and L 10527. Falb suggests variability in B from the different estimates in the various star catalogues.

1867.79	222°7	36″11	4*n*	Δ	5.2...6.1
1879.42	222.9	35.68	3*n*	Doubiago	

[Ma (*F. S.* **II**)...H²...Ma (**XIII**)...En...Ra (**XXXI**)...Falb (2026)...Δ (**II**)...OΣ (**X**)...Je (2329)...*Annals Toulouse Obsy.* **III**...]

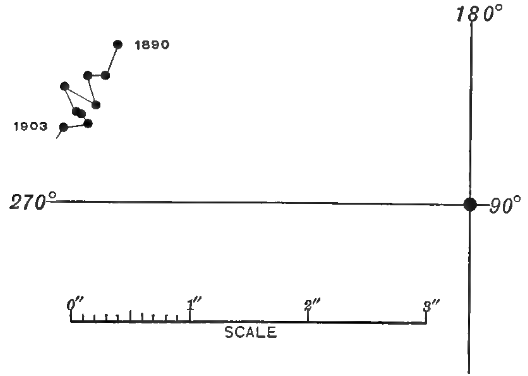
29 13 **2834.** Σ 740. Fixed.

1868.40	118°6	21″78	4*n*	Δ
1893.10	119.0	21.80	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Glasenapp (**II**)... Espin (*Brit. Ast. Ass'n* **III**, 229)...]

29 14 **2835.** *Tauri* 380. Σ 742. (= ♅ I. 70 = **S** 487.) Very slow motion in angle; no change in the distance. Proper motion of both stars in *A. G. Berlin*:

A = 0″057 in 209°2
B = 0.089 in 250.3



Σ 742

1782.86	233°6	....	1*n*	♅
1830.22	246.2	3″31	3*n*	Σ
1837.10	251.1	3.32	2*n*	Σ
1848.17	252.0	3.45	4*n*	OΣ
1868.77	255.7	3.31	4*n*	Δ
1876.08	254.3	3.62	3*n*	Hl
1883.60	257.3	3.47	6*n*	En
1890.19	257.6	3.41	3*n*	Hl
1892.93	258.6	3.34	2*n*	Jones
1903.29	259.7	3.52	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**IX, XI, XIII, XV**)... Ba (**II, III, IV**)...Bp...H¹...Da¹...Da³... Wr... En (1673, 2663)... Se... Se²... Se³... Ra (**XXIII**)...Δ (1015, 1256)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)... Hd...WS...Gl...Sp (2132)...Sp (**II**)...Do (2196, 2316, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Pl... Bru²... Je (2449)... OΣ (**IX**)... Big... Hl (**I, II**)... T (3185)... Jones (*Proc. Haverford Coll. Obsy.* 1892)...Lewis (*Mon. Not.* **LIV**, 314)...Glasenapp (**II**)...Collins (*A. J.* 378)...Maw (**III**)...HΣ (**XII**)...Maw (**IV**)...Sk⁵...Biesbroeck...]

2836. Σ 746 *rej.* This is No. 629 of Bond's catalogue of stars about the nebula of *Orion*. $29^m 23^s$

1904.85	219°1	13″98	2*n*	β⁶	9.3...9.3

2837. θ^1 *Orionis.* Σ 748. (ABCD = ♅ III. 1 = **S** 486.) 29 23
The well-known Trapezium in the great nebula of *Orion*. The four principal stars are visible with a very small aperture. The fifth star, E, was discovered by Struve in 1826. The sixth star, F, not in *Mensurae Micrometricae*, was discovered by Herschel in 1830. These small stars have been often suspected to be variable, from the difficulty of seeing them at times. I have seen them with a 6-inch refractor cut down to 3¾-inches, but with unsuitable conditions both would be invisible with an aperture larger than six inches. They are atmospheric tests, and in my own observations I have found nothing to suggest any variability in their light. The largest star of the group, C, which is θ^1 *Orionis*, was found to be a spectroscopic binary by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XIX, pp. 153, 354).

There has been no change in the relative places of any of these stars since the measures of Struve. The proper motion of C is small, 0″036 in 305°1 (Auwers).

A and B

1836.15	31°6	8″71	3*n*	Σ
1867.04	32.4	8.62	5*n*	Δ
1873.69	31.8	8.61	2*n*	OΣ
1878.17	33.5	8.80	6*n*	Hl
1888.88	32.3	8.74	3*n*	β

A and C

1836.15	131°6	13″00	3*n*	Σ
1867.04	131.0	12.88	5*n*	Δ
1868.20	132.4	13.25	5*n*	OΣ
1878.14	130.7	13.20	7*n*	Hl
1888.88	131.3	12.95	3*n*	β

A and D

1836.15	95°4	21″41	3*n*	Σ
1867.04	95.7	21.55	5*n*	Δ
1872.20	95.2	21.40	3*n*	OΣ
1878.17	95.6	21.67	7*n*	Hl
1888.88	95.4	21.55	3*n*	β

A and E (fifth star)

1832.53	353°6	3″86	7*n*	Σ
1867.04	350.6	3.88	5*n*	Δ
1859.62	350.8	4.29	4*n*	OΣ
1877.10	351.5	4.21	4*n*	Hl
1888.88	351.5	4.31	3*n*	β

B and C

1836.15	162°1	16″85	3*n*	Σ
1867.04	162.5	16.72	5*n*	Δ
1868.20	163.6	16.89	5*n*	OΣ
1878.16	162.5	16.77	7*n*	Hl
1888.88	163.0	16.76	3*n*	β

D and B

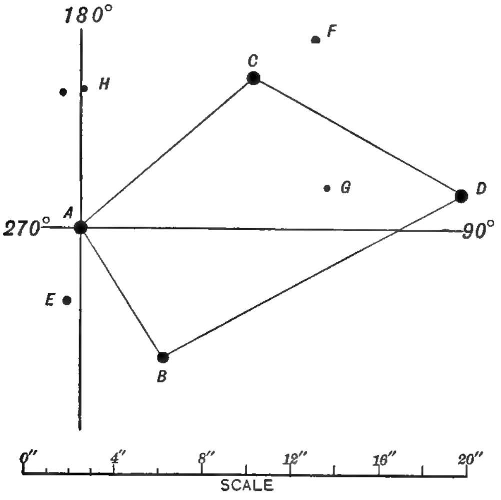
1836.15	299°.4	19″.23	3*n*	Σ
1867.04	299.7	19.25	5*n*	Δ
1873.69	300.2	19.29	2*n*	OΣ
1878.17	299.2	19.39	6*n*	Hl
1888.88	299.5	19.39	3*n*	β

D and C

1836.15	240°.3	13″.34	3*n*	Σ
1867.04	241.5	13.39	5*n*	Δ
1868.20	241.8	13.41	5*n*	OΣ
1878.16	241.5	13.41	7*n*	Hl
1888.87	241.3	13.35	3*n*	β

C and F (sixth star)

1858.78	128°.8	3″.73	9*n*	OΣ
1867.04	126.1	3.96	5*n*	Δ
1877.10	120.8	4.00	4*n*	Hl
1888.86	120.9	3.99	3*n*	β



Trapezium of Orion

Shortly after the 36-inch refractor was put in place at the Lick Observatory, Alvan G. Clark discovered the excessively faint star, G, within the trapezium, and later in the same year the faint double star H on the preceding side of the trapezium was discovered by Barnard. Both stars are exceedingly difficult with that instrument under the best conditions at Mt. Hamilton. There are no measures of these stars since my own given in Part I. Barnard was also confident of the existence of another faint star in the trapezium nearly on the line joining BC, but of this there are no later observations.

The interior of the trapezium was a favorite place for the alleged discovery of new stars in the last half of the nineteenth century. At least a dozen stars have been claimed to have been seen in this limited area, and some of them verified by other observers with other inferior telescopes. There never was at any time, at least after this region had been studied with the large refractors at Washington and Chicago, any probability that these stars were real. The late Herbert Sadler carefully compiled these observations and gave a diagram showing the described places (*English Mechanic* Jan. 13, 1882). Under no circumstances could the Clark and Barnard stars be seen with telescopes twice as powerful as those used by these various observers.

The following references relate to the mythical stars alleged to have been seen within the trapezium, all of which it is certain have no real existence:

[Sadler (*Eng. Mech.* **XXXIV**, 448) (*Sid. Mess.* **VII**, 217) .... Lassell (*Mon. Not.* **XVII**, 68; **XXII**, 164, 276) .... Common (*Ast. Reg.* **XVIII**, 116) .... D'Abadie (*Mon. Not.* **XVII**, 245, 266)... Huggins (*Mon. Not.* **XXVI**, 71) (*Ast. Reg.* **V**, 54)... Gill (*Mon. Not.* **XXVII**, 315)... Buckingham (*Mon. Not.* **XXXIII**, 228) ...Tempel (1898)...Denning (1915)(*Observatory* **III**, 356)(*Ast. Reg.* **IX**, 37) ...Salter (*Ast. Reg.* **VIII**, 60, 96)...Key (*Ast. Reg.* **IV**, 134)...Byles (*Observatory* **V**, 86)...Porro (1091)(*Comp. Rend.* **XLIV**, 1031)...]

The following relate to θ *Orionis* as a multiple star:

[Ma(*F. S.* **I**, 65)...Ma(**X, XI, XIII, XV**)...Bp...Da^3...Ek^1...Se^1...Ra(**XXIII, XXXI**)...Hd...WJ^2...H (**V**)...Ba (**II**)...Cin^4...Nobile (*Rend. della R. Accad. Sci.*, Napoli, March 1877).... OΣ (**IX**) (**X**, p. 154)....Holden (*Wash. Obsns.* 1877, App. II; 1878, App. I).... Le Verrier (*Comp. Rend.* **XLIV**, 1074, 1293, 1295)...Se(*Comp. Rend.* **XLIV**, 1279; **XLV**, 170)...Flm...Cin^4...Cin^5 Cin^6...Pk...Ma (324)...Je (2279, 2345)...OΣ (*Mon. Not.* **XVII**, 225)... Common (*Mon. Not.* **XLIII**, 255)...Barneby (*Mon. Not.* **XXXIV**, 248)...Δ (**II**, pp. 131, 576)... Sadler (*Eng. Mech.* **XLI**, 9)... Hayn (3051)... Big... Hl (I).. Glasenapp (**II, III**)... Do (3680, 3798, 3930)... β^1...β^2...β^3...β (2929)... β (*Mon. Not.* **XLIX**, 352)... β (*Pub. L. O.* **II**)... *Annals Toulouse Obsy.* **III** ...Solá (3751, 3753, 3793)...]

2838. **H 1157.** "The star *y* in my chart of the nebula of *Orion*." P and D from H (V). In H (VIII) 15 and 16m; $2^s f\,\theta^1$, and 2′ 43″ *n*. The only observation since Herschel is: 29^m 25^s

1904.97	305°.3	8″.91	2*n*	β^6	12.8...12.8

2839. θ^2 *Orionis.* **Σ 16, App. I.** (= S 488.) Unchanged. 29 29
θ^2 *Orionis*, like θ^1, is a spectroscopic binary, discovered by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XIX, pp. 153, 154).

1863.06	92°.4	52″.27	6*n*	En
1869.57	92.3	52.56	4*n*	Δ
1878.86	92.3	52.83	9*n*	Je
1905.00	92.7	52.27	2*n*	β

Δ measures a 7.6m star:

1869.57	97°.6	128″.80	4*n*	Δ
1905.00	97.7	128.47	2*n*	β

[En...Δ (**II**)...Pk...Je (2329)...Glasenapp (**II**)...β^6...]

2840. θ^1 and θ^2 *Orionis.* **Σ 17, App. I.** Unchanged.
Both stars spectroscopic binaries, discovered by Frost and Adams at the Yerkes Observatory.

1870.20	134°.1	135″.24	5*n*	Δ
1878.73	134.2	135.61	5*n*	Je
1905.00	134.2	135.28	2*n*	β

[En...Δ (**II**)...Je (2329)...Glasenapp (**II**)...β^6...]

2841. 42 *Orionis.* **Da 4.** Discovered by Dawes with the 6½-inch refractor, December 12, 1847, and independently and probably earlier by Bond, who mentioned it in his first paper on the nebula of *Orion* read April 3, 1848 (*Mems. Am. Acad.* 29 30

III, 87). The components appear to be fixed. The principal star has a proper motion of 0″026 in 312°8 (Auwers).

1876.06	217°7	1″73	4*n*	Δ	5.5...8.7
1892.99	217.8	1.80	2*n*	Jones	

[Da (*Mon. Not.* **VIII**, 53) (*Mon. Not.* **XXIV**, 117)...Da^3...WJ^2...Hd...Δ (I)... Cin^5.... Wilson (Cin^{10}).... Collins (*A. J.* 278).... Collins and Jones (*Proc. Haverford Coll. Obsy.* 1892, pp. 13, 34)...]

$29^{m}\ 34^{s}$ **2842.** Σ 750. (= H II. 26.) Unchanged.

1866.39	61°7	4″09	3*n*	Δ
1893.12	61.3	3.85	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...Bp...Da^3...Ra (**XXIII, XXX**)...Δ (1204)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Se^1 (called Σ 743)...Cin^3...Cin^5...T (2898)... Glasenapp (**II**)...]

29 34 **2843.** ι *Orionis.* Σ 752. (= H III. 12 = S 491.) No motion since the measures of Struve. The principal star is given a proper motion of 0″012 in 303°7 (Auwers). This is a spectroscopic binary, discovered by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XVIII, 386).

1867.13	142°0	11″43	3*n*	Δ
1889.96	140.7	11.22	3*n*	Giacomelli
1903.22	141.7	11.50	3*n*	Biesbroeck

There is a distant star, not measured by Struve:

1824.08	103°4	49″78	1*n*	South
1904.97	103.2	49.08	2*n*	β

[Ma (**IX, XI**)...H (**V**)...K...Wr...Ra (**XXIII**)...Mu...Se...Se^3...Da^1... Da^3...Δ (1015)...Δ (**I, II**)...Pk...Schmidt (2055)...Sp (**II**)...T (2898)... Cin^6...Giacomelli (**I**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Do (3798)...Biesbroeck...β^6...]

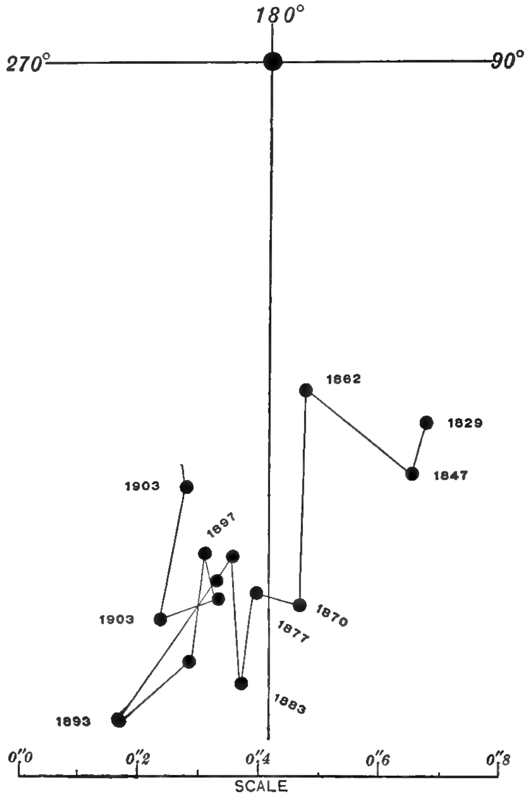
29 38 **2844.** S 490. In Bond 10 m, $15^{s}1$ *f* θ^1 and 110′5 *s*. The only measures since 1825 are;

1900.77	214°5	78″12	2*n*	β^5	8.2...8.7

29 39 **2845.** Σ 749. Slow retrograde motion. Some of the later observers reverse the angle. Those given below are changed when necessary to conform to Σ. The best of the measures are remarkably discordant in both angle and distance.

1829.48	23°4	0″67	4*n*	Σ
1847.19	19.0	0.74	4*n*	OΣ
1862.98	6.4	0.56	5*n*	Δ
1870.52	3.3	0.92	3*n*	Δ
1877.21	358.8	0.90	4*n*	Sp
1883.70	357.6	1.05	6*n*	En
1887.76	356.0	0.84	6*n*	Sp
1891.63	354.4	0.88	5*n*	HΣ
1893.15	347.4	1.14	2*n*	Lewis
1896.04	352.6	1.02	5*n*	Coleman
1897.50	352.8	0.84	9*n*	Gr. Obsy.
1900.16	354.8	0.91	3*n*	Bryant
1903.03	349.4	0.96	2*n*	Lewis
1903.21	349.4	0.73	2*n*	Biesbroeck

Bowyer measures a pair described as "near Σ 749," 287°8 : 4″43 (1897.01) 1*n*. Place and magnitudes not given.



Σ 749

[Ma (*F. S.* I)....Ma (**XI**)....Se....Se (*Comp. Rend.* **XLVIII**, 375)....Flm.... OΣ (**IX**) (**X**, p. 156)...Δ (1110, 1473)...Δ (**I, II**)...En...En (1673)...Do (2303, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)....En (2663)....Sp (**II**)....Sp (**II**, App.)...T (2898)...Glasenapp (**II**)...Holmes (*Brit. Ast. Ass'n* **V**, 78)... Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Hu (*A. J.* 427)...Maw (**III**) ....Coleman (*Mem. R. A. S.* **LIII**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 792)...HΣ (**XII**) ...Sk^5...Biesbroeck...]

2846. H 3276. "A 6 m star follows." This is 122 *Tauri.* $29^{m}\ 41^{s}$ The only measures are:

1904.95	65°1	20″81	2*n*	Miller	10...10

2847. Σ 751. Unchanged. 29 42

1868.99	123°5	15″52	4*n*	Δ
1904.99	123.9	15.37	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H (**VII**)...Hd...Δ (**II**)...β^6....]

2849. 45 *Orionis.* **Hn** —. Two faint companions discovered by Holden with the Washington 26-inch. This star has a proper motion of 0″012 in 337″8 (Auwers). The only other measures are: 29 44

AB	1904.37	170°2	19″84	2*n*	β^6	...12.7
AC	1904.77	34.4	19.13	2*n*	β^6	...15

$30^m\ 1^s$ **2850.** **Da 3.** Discovered by Dawes in 1847. This is No. 135 of Herschel's catalogue of stars about the nebula of *Orion*. Change uncertain.

1875.39 174°9 1″06 4*n* Δ 7.5...8.8

[Da (*Mon. Not.* **VIII**, 31) (*Mon. Not.* **XXIV**, 117)...Da^3...Hd...Δ (I)...]
(See p. 1066)

30 13 **2851.** **Bond.** No. 880 of Bond's catalogue of stars about the nebula of *Orion*. The only measure is:

1905.03 63°7 2″97 1*n* β^6 10.0...11.5

30 39 **2853.** **Weisse 9.** Marked "duplex" in W^1. This is in list by Schjellerup, 140° : 15″ : 8.5...9.5. The estimate was made in February, 1865. These observations, in connection with my measures of 1901, made some change in the distance probable, and it was re-measured later. The meridian positions of A do not show any certain proper motion. The components are SD (13°) 1192 and 1193.

1901.99	151°7	44″26	2*n*	β	8.5...9.8
1902.84	152.2	44.49	5*n*	β	
1903.95	151.7	44.52	2*n*	β	

I have measured also a third star 10.5 m:

1902.84 305°2 52″59 3*n* β

[Schj (1485)...β^5...β^6...]

30 44 **2854.** *Orionis* 158. **Σ 754.** Apparently fixed.

1867.14	287°6	5″18	3*n*	Δ
1905.03	288.0	5.20	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

30 55 **2856.** **β 1050.** A difficult pair of small stars in the nebula of *Orion*, $1^m\ 32^s$ *f* of *θ′ Orionis*, and 5′ *s*. Discovered with the 36-inch. It is No. 974 of Bond's catalogue of stars in the great nebula. The only later measure is:

1898.94 283°6 0″65 1*n* A

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...A (3638)...]

30 56 **2857.** **26** *Aurigae*. **β 1240.** (AC = **Σ 753 = H III. 64 = S 492 : AD = β 90.**) The close pair was discovered with the 36-inch. The fourth star, D, was noted with the 6-inch in 1872, but it had been previously seen by Morton at Lord Wrottesley's Observatory, though apparently overlooked by Herschel and Struve. It was first measured in 1877. The distance in that observation, by a clerical error, was printed 25″86 in β^1. It should have been as given here.

The annual proper motion of 26 *Aurigae* is 0″044 in the direction of 276°5 (Auwers). This movement, though small, is sufficient to show that the Σ companion is moving in space with exactly the same proper motion Otherwise, with this motion of A, and Σ's position of C, the latter star for 1898.7 should be 265°2 : 9″27. The change in D corresponds to the proper motion of AB, and this star, therefore, is not a member of the system.

The change in the close pair is slower than might be expected in a star of this class. So far the distance has remained unchanged. The following are all the measures:

A and B

1892.00	344°4	0″15	3*n*	β
1892.84	354.2	0.22	3*n*	Barnard
1893.22	342.9	0.15±	1*n*	Sp
1893.94	342.5	0.16	1*n*	Barnard
1894.17	347.2	0.20±	4*n*	Sp
1896.13	338.8	0.20±	9*n*	Sp
1899.14	351.0	0.20	3*n*	Lewis
1899.92	330.6	0.20	2*n*	A
1900.20	346.4	0.28	1*n*	Bowyer
1900.87	332.8	0.21	4*n*	A
1901.12	336.4	0.22	2*n*	Bryant
1901.28	331.1	0.18	2*n*	Lewis
1902.19	330.0	0.24	3*n*	Bryant
1903.14	319.1	0.20	2*n*	Bryant
1903.13	332.5	0.21	1*n*	Bowyer

AB and C (= Σ 753)

1828.61	268°0	12″34	3*n*	Σ
1865.52	268.0	12.39	3*n*	Δ
1880.95	268.3	12.17	3*n*	Sp
1891.95	268.3	12.25	4*n*	β
1895.54	268.4	12.41	10*n*	Sp
1903.57	267.6	12.42	2*n*	Bowyer

AB and D (= β 90)

1877.87	113°2	31″47	1*n*	β
1891.97	112.7	32.33	3*n*	β
1898.96	112.4	32.97	2*n*	β
1905.03	112.4	33.16	3*n*	β

[β (**II, XVIII**)...β (*Mon. Not.* **XXXIII**, 437)...β^1...β (3113)...β (*A. J.* 256)...β (*Pub. L. O.* **II**)...Sp (**III**)...Barnard (*A. J.* 447)...Greenwich Obsy. (*Mon. Not.* **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 793)...A (3638) (*Bul. L. O.* No. 11)...β^6...]
(See p. 1066)

The following references are to observations of the Struve companion. A few only of the measures are given above.

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...Bp...Da^3...Ba (**I, II**)...J^2...WJ^2...Ra (**XXIII, XXX**)...Wr...Se...Gl...OΣ (**IX**)...Δ (1036)...Δ (**I, II**)...Du...Sp (**II**)...]

2858. **Σ 739.** Probably unchanged. $31^m\ 19^s$

1868.27 248°2 2″23 4*n* Δ

There is a distant 9.5 m star, not in Σ.

1881.29	65°0	38″14	1*n*	OΣ
1886.17	65.6	38.44	3*n*	Eng

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...OΣ (**X**, pp. 13, 154)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Engelhardt (**II**) (2785)...]
(See No. 13073)

2859. **Hd 75.** This is 9.5 m in DM, but it seemed decidedly fainter. 31 20

1904.15 343°5 29″04 1*n* β^6 10.0...10.3

2860. **Harvard Zones.** Measures from Cin^6. This is in the field with DM (−0°) 1029. The double is 58″7 distant in 245°1. 31 20

1904.15 39°7 17″06 1*n* β^6 12...12

31^m 23^s **2861.** **Σ** 756 *rej.* The only measures are:

1904.83	236°0	23″74	*2n*	β^6	8.6...9.5

31 27 **2862.** **OΣ** 518. Description from *Poulkowa Catalogue* of 1850. Dembowski failed to see any trace of the close star in 1870. I tried it many times with the 6-inch with the same result. A distant companion, 11 m, at 240° was readily seen, and that is probably C of OΣ. Nothing else could be seen with the 18½-inch, 1877.

The small star does not appear to have been seen until it was measured by Hussey with the 36-inch. In view of the failures to see it heretofore, it should be observed from time to time.

1898.87	281°7	1″49	*3n*	Hu	8.5...12.5

The only measure of the distant star is:

1905.07	238°4	40″21	*1n*	β

[OΣ (**IX**)...*Δ* (**I**, p. 230)...Hu (*Pub. L. O.* **V**)...β^6...]

31 29 **2863.** **β** 89. Discovered with the 6-inch. It is 1^m 23^s *f* ε *Orionis*, and 12′ 57″ *s*. A difficult pair with that aperture. It has no appreciable proper motion (Porter).

1878.40	356°1	0″81	*2n*	Cin
1879.59	361.6	0.73	*4n*	β
1888.52	360.1	0.88	*2n*	Lv
1889.15	362.1	0.77	*4n*	Sp
1891.15	360.9	0.72	*3n*	Sp
1898.88	357.2	0.75	*4n*	A
1898.88	361.6	0.74	*1n*	β
1898.91	361.7	0.95	*2n*	Cg

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β^3...*Δ* (**I**)...Cin^5...Lv^1...Lv (*Sid. Mess.* **VIII**, 77)...Sp (**III**)...Cogshall (*A. J.* 478)...A (3584)...]

31 33 **2864.** Measured by β^6 in looking for No. 2853.

31 41 **2866.** **OΣ** 112. The measures are conflicting, but the change, if any, is small.

1843.27	89°1	0″51	*2n*	Ma
1852.27	90.6	0.45	*1n*	Ma
1867.43	79.8	....	*3n*	Δ
1879.78	77.3	0.69	*2n*	β
1885.08	74.1	0.68	*2n*	Per
1897.97	72.6	0.75	*3n*	Hu
1903.16	69.6	0.60	*2n*	Bowyer

[Ma (**XI**, **XIII**)...OΣ (**IX**)...Flm...Do (2322)...*Δ* (**I**)...β^3...Per...Per (2749)...Big (*Bul. Ast.* **XII**, 299)...Hu (*A. J.* 427) (*Pub. L. O.* **V**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIV**, 793)...Sk^5...]

31 42 **2867.** **OΣ (App)** 65. B is L 10614, 3^{s}0 *f* and 69′1 *n*. The later measures are:

AB	1903.92	31°4	79″80	*2n*	β	
BC	1903.90	62.5	21.02	*1n*	β	...14

[OΣ (**I**)...β^6...]

2869. **Σ** 759. Without change. The 40-inch shows a 13 m star, 284°8 : 17″8. 31^m 47^s

1868.68	324°1	29″58	*4n*	Δ
1905.03	325.1	29.49	*1n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VI**)...*Δ* (**II**)...Cin^6...β^6...]

2870. **Pritchett.** Described as "near Σ 782;" but that star is about 5^m *f* the place given. 31 48

2871. **Σ** 755. Probably without change. 31 52

1866.16	315°5	6″12	*3n*	Δ
1893.13	316.9	5.79	*2n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin^6...β^3...Glasenapp (**II**)...]

2873. **Σ** 757 and **Σ** 758. (AE = **S** 493; CD = **♅ III.** 111 = **S** 494.) All relatively fixed. 31 58

A and B

1868.77	239°3	1″70	*3n*	Δ
1904.84	240.0	1.61	*1n*	β

C and D

1868.77	297°1	11″16	*3n*	Δ
1904.49	297.6	11.34	*2n*	β

A and C

1868.77	86°7	50″92	*3n*	Δ
1904.49	86.9	50.94	*2n*	β

A and E

1904.15	262°4	138″64	*1n*	β

[Ma (*F. S.* **I**)...H^1...Se...Se^1 (name of pair omitted)...*Δ* (1204)...*Δ* (**I**, **II**)...Cin^5...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

2875. **β** 1051. A difficult pair in the nebula of *Orion;* discovered with the 36-inch. It is 2^m 38^s *f* θ′ *Orionis*, and 31′ *n*. A 7½ m star 22^s.4 *p* and 2′ 34″ *n* of the new pair. No other measures. 32 1

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...]

2879. **Σ** 703 *rej.* The only measure is: 32 20:

1905.03	54°5	35″96	*1n*	β^6	8.6...9.5

2880. **H** 3277. "The *nf* of two equal stars." The other star is 2^s.6 *p*, and 2′6 *s* of this. Companion not seen with the 6-inch in 1876. Near Σ 759. The only measure is: 32 23

1900.75	69°8	23″07	*2n*	β^5	8.8...13

2881. **Σ** 761. (= **♅ II.** 11 = **Sh** 66.) Erroneously called ♅ II. 10 by Σ. ♅ calls the principal star σ^1 *Orionis*. Fixed. 32 33

A and B

1868.42	201°5	68″48	*3n*	Δ
1887.03	202.2	68.13	*1n*	Toulouse
1905.03	201.7	68.04	*1n*	β

B and C

1868.42	267°.8	8″.15	3*n*	Δ
1893.17	267.8	8.38	2*n*	Gla
1905.03	268.2	8.46	1*n*	β

[Ma (*F. S.* I) ... Ma (**XI**) ... Da[1] ... WJ ... Δ (II) ... Hd ... Cin[5] ... Glasenapp, (II) ... Solá (3529) ... *Annals Toulouse Obsy.* **III** ... β[6] ...]

32^{m} 40^{s} **2882.** Σ 763. No motion since Struve.

1868.00	319°.3	5″.83	4*n*	Δ
1904.82	318.0	5.82	2*n*	β

[Ma (*F. S.* I) ... Ma (**XI, XIII**) ... Δ (II) ... β[6] ...]

32 43 **2883.** *σ Orionis.* **β** 1032. (ACD = **H II.** 10 = **Sh** 63 = **Σ** 762.) The close pair was discovered with the 12-inch. It is certain to be a binary, and the measures already indicate retrograde motion. The maximum distance probably does not exceed 0″.25. Auwers gives the principle star a proper motion of 0″.024 in the direction of 297°.7. This star is a spectroscopic binary, discovered by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XIX, 153).

The following are all the measures of the close pair:

A and B

1888.81	357°.0	0″.26	4*n*	β
1890.20	353.7	0.3±	2*n*	Sp
1890.81	351.6	0.29	3*n*	β
1891.16	360.5	0.25±	1*n*	Sp
1891.88	349.7	0.23	3*n*	β
1892.22	348.7	0.25±	2*n*	Sp
1893.22	349.3	0.25±	3*n*	Sp
1896.21	346.4	0.25±	1*n*	Sp
1898.87	332.9	0.27	3*n*	A
1899.79	329.0	0.20	3*n*	A
1901.76	329.1	0.20	2*n*	A

There is no relative change in the distant stars, and they must therefore have the same proper motion as σ. An annual movement of even 0″.02 in the time covered by the measures would be apparent if either of these companions was fixed in space. With this proper motion, and the positions of Σ for the distant companions, at this time (1899.1) they should be:

AC	228°.7	10″.33
AD	88.0	14.24

AB and C (= Σ 762)

1831.42	236°.5	11″.00	4*n*	Σ
1869.97	235.4	11.07	4*n*	Δ
1888.84	237.1	11.23	3*n*	β
1899.12	237.4	11.28	3*n*	β

AB and D (= Σ 762)

1831.20	84°.5	12″.86	3*n*	Σ
1869.97	85.1	12.76	4*n*	Δ
1888.84	83.3	12.84	3*n*	β
1893.62	83.7	12.96	5*n*	Sp
1899.12	82.8	12.77	3*n*	β

AB and E

1869.97	60°.9	41″.64	4*n*	Δ
1899.12	60.9	41.42	3*n*	β

E and D

1831.20	230°.8	30″.03	3*n*	Σ
1871.34	230.9	30.10	3*n*	Δ

[β (XIV) ... β (2875, 3048, 3114) (*Pub. L. O.* **II**) ... Sp (**III**) ... A (3584, 3638) (***Bul.*** *L. O.* No. 11) ...]

The following relate to the old companions:

[Ma (*F. S.* I) ... Ma (**XI, XIII, XV**) ... H[3] ... Bp ... Da[1] ... Ra (**XXIII, XLVI**) ... J[1] ... Mu ... En ... Hd ... WS[2] ... Nobile (*Rend. Accad. Sci. Napoli*, Jan. 1875) ... Webb (*Mon. Not.* **XX**, 253) ... Da (*Mon. Not.* **XX**, 285) ... Δ (II) ... Cin[5] ... Gaudibert (*Soc. Ast. France Bul.* 1890) ... Hl (II) ... Hahn (*Mikrom. Ver. des Sternhaufens* Σ 762, Leipzig, 1891) ... Glasenapp (II) ... Solá (3529) ... *Annals Toulouse Obsy.* **III** ...]

2884. A. G. 99. Double in *A. G. Berlin.* 32^{m} 48^{s}

1902.70	143°.1	7″.03	3*n*	Cogshall

[Kustner (3821) ... Cogshall (*A. J.* 546) ...]

2885. OΣ 113. (= **H** 3278.) Fixed. In the first of the three observations by OΣ, the large star was noted as perhaps elongated. It was certainly round with the 18½-inch in 1877. 33 9

1867.91	28°.9	9″.83	3*n*	Δ
1898.79	27.5	10.21	3*n*	Hu

[Ma (**XI**) ... OΣ (**IX**) ... Δ (I) ... Hu (*Pub. L. O.* **V**) ...]

2886. Σ 766. (= **S** 496.) Unchanged. 33 26

1865.65	275°.4	9″.72	3*n*	Δ
1896.10	275.1	10.01	2*n*	Coleman

[Ma (*F. S.* I) ... Ma (**XI**) ... Ra (**XXX**) ... Δ (1204) ... Δ (I, II) ... Glasenapp (II) ... Coleman (*Mem. R. A. S.* **LIII**) ...]

2887. Σ 764. (= **H** N. 75 = **S** 495.) Fixed. 33 42

1867.91	13°.6	26″.13	4*n*	Δ
1905.07	13.8	25.86	1*n*	β

[Ma (*F. S.* **II**) ... Ra (**XXVII**) ... Δ (1204) ... Δ (I, II) ... β[6] ...]

2889. *Leporis* 45. **β** 321. The five principal stars of this group were observed by Herschel (*Cape Observations*), and entered as H 3780, with the description "Quintuple, 6th and 7th classes, magnitudes 7, 7, 8, 8, 8." With the 6-inch I found that two of these stars were close doubles, and noted two more faint stars in the group. The four bright stars, A, E, C, and F, are, respectively, 10726, 10727, 10728, and 10725 of Lalande. The group is just visible to the naked eye as a 6 m star. 33 59

The measures give no certain evidence of motion in the close pairs.

A and B

1877.11	142°.4	1″.06	1*n*	Cin
1877.33	144.5	0.68	3*n*	Δ
1879.48	139.2	0.99	3*n*	β
1888.92	141.2	0.76	2*n*	Lv
1891.15	145.4	0.6±	2*n*	Sp
1896.20	153.0	0.55	1*n*	Sp
1898.16	143.1	0.81	1*n*	See

C and D

1877.11	358°0	1″56	1*n*	Cin
1877.34	357.5	1.26	3*n*	Δ
1879.48	359.4	1.49	3*n*	β
1888.94	358.8	1.40	2*n*	Lv
1898.16	358.7	1.44	1*n*	See

AB and C

1879.18	136°0	88″41	3*n*	β
1893.16	135.8	89.30	3*n*	Gla
1898.16	136.6	89.29	1*n*	See

AB and E

1893.16	6°3	76″23	2*n*	Gla

[β (**VI**)...β (2062)...β1...β3...Δ (**II**)...Cin4...Lv1...Knott (*Observatory* **IV**, 184, 212)...Sp (**III**)...Glasenapp (**II**)...See (   )...]

34^m 3^s **2891.** **Weisse 10.** "Duplex" in Weisse. The components are DM (40°) 1383 and 1384. The only measure is:

1901.78	17°9	20″98	2*n*	β^5	9.0...9.0

34 22 **2896.** 126 *Tauri.* **β 1007.** Discovered with the 12-inch on Mt. Hamilton in 1881. It was single or too close for the 36-inch 1890–92. The measures since then show but little change in the angle, but a whole revolution may be covered by the observations. The components are nearly equal, and therefore some of the measures may require a correction of 180°. In my measure with the 40-inch in 1897 it was noted: "The distance is less than 0″3; the smaller star is *p*." In the first set of measures in 1881 with the 12-inch it was stated: "The measured distances are decidedly too large." The distance is probably always less than 0″25. There is little doubt of its being a binary of short period.

The proper motion is small, 0″013 in the direction of 173°7 (Auwers). The following are all the measures:

1881.86	266°2	0″27	2*n*	β
1887.16	249.5	0.3±	3*n*	Sp
1888.07	241.7	0.2±	2*n*	Sp
1889.10	239.3	0.3±	5*n*	Sp
1890.78	Single with 1000, 36-in.		1*n*	β
1891.79	Elongation doubtful, 36-in.		1*n*	β
1892.06	Perhaps elongation in 330°		1*n*	β
1894.16	243.6	0.22±	2*n*	Sp
1896.15	230.8	0.20±	3*n*	Sp
1897.13	226.9	0.20±	2*n*	Sp
1897.81	245.1	0.36	1*n*	β
1898.20	227.2	0.20	1*n*	Sp
1899.54	243.5	0.21	3*n*	A
1900.71	250.0	0.18	2*n*	A
1901.73	247.7	0.20	3*n*	A
1901.85	254.2	0.22	6*n*	Bryant
1903.90	254.4	0.20	1*n*	A

[β (**XIII**)...β3...β (3048, 3114) (*Pub. L. O.* **II**)...Sp (**III**)...A (3638) (*Pub. A. S. P.* **XII**, 31) (*Bul. L. O.* No. 11)...Bryant (*Mon. Not.* **LXI**, 486; **LXIII**, 403; **LXIV**, 793)...]

(See p. 1066)

34 30 **2898.** **Σ 770.** As there has been no change since Dembowski, the angle in Struve would seem to be too large.

1870.14	333°4	1″10	3*n*	Δ
1894.18	334.0	1.22	2*n*	HΣ
1896.18	334.2	1.20	3*n*	A

[H (**V**)...Δ (**II**)...Flm...Δ (2194)...HΣ (**XII**)...A (3395)...]

2899. **Hd 78.** In another observation a 10½m star, 82°8 : 31″0. 34^m 35^s

AB	1888.36	124°4	11″28	3*n*	T	
	1903.92	123.7	10.88	2*n*	β	7.5... 8.2
AC	1903.92	82.1	32.18	2*n*	β	...11.0

[Hd...T (2991)...See (3495)...β6...]

2900. **β 322.** Discovered with the 6-inch. The later measures are: 34 40

1894.10	104°3	1″97	2*n*	Sellors
1898.14	103.4	2.76	1*n*	See
1898.83	103.0	2.87	1*n*	Bd

[β (**VI**)...β (2062)...Cin4...See (   )...Boothroyd (*A. J.* 478)...Sellors (3303)...]

2901. **Σ 771.** This is DM (19°) 1026. The motion is rectilinear. Some of the later observers reverse the position-angle. 34 42

1829.12	234°6	26″34	3*n*	Σ	
1847.19	233.2	25.43	1*n*	Ma	
1866.73	234.7	24.84	3*n*	Δ	9.4...9.2
1894.18	234.8	24.43	2*n*	HΣ	
1896.18	234.7	24.12	3*n*	A	
1901.85	235.2	24.14	2*n*	β	9.2...9.0

In looking for this a similar pair was measured 4^s *f* and 7′ *n*. That is DM (19°) 1027.

1901.85	312°5	29″25	2*n*	β	8.9...10.4

[Ma (*F. S.* **II**)...Δ (1735)...Δ (**II**)...Flm...A (3395)...HΣ (**XII**)...β6...]

2902. ζ *Orionis.* **Σ 774.** (= **Sh 67** : AC = **♅ IV. 21.**) B was discovered by Kunowski (*Ast. Jahr.* 1825). No change in B, and probably none in the distant star C. The proper motion of the principal star is given, 0″016 in 309°8 (*A. G. Nico*). 34 42

1866.82	151°9	2″61	3*n*	Δ
1877.08	151.2	2.47	14*n*	Sp
1880.52	151.8	2.87	2*n*	β
1886.67	155.5	2.74	6*n*	Hl
1903.23	156.3	2.43	3*n*	Biesbroeck

For the Herschel star we have:

1880.15	9°3	57″22	2*n*	β
1903.87	9.0	57.67	3*n*	β

[Ma (**IX, X, XI, XIII, XV**)...Ma (324, 430)...Ma (*F. S.* **I**)...Fl...J2...WJ...WJ2 P1...J (*Mon. Not.* **XIV**, 242)...Wr...Wn (1738)...Wh...K...K (409)...Wn (**V**)...Lassell (858)...Lassell (*Mon. Not.* **XIII**, 183)...Da1...Da2...Da3...Ra (**XXIII**)...Se...Se3...Bes...Mu...Auwers (1393)...Lu (**II, III**)...H1...H2...H (**VII**)...OΣ (**IX**)...Ba (**II, IV**)...Bp...Ek (**I**)...Δ (1015, 1036, 1256)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...WS...Hd...Gl...Du...Sp (2132)...Sp (**II**)...Do (2196, 2989, 3378, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk2...Flm...Cin5...Cin6...Pk...Je (2345)...β1...β2...β3...Franz (2590)...Pt...En (2663)...T (2866)...Hl (**I, II**)...Hl (*Wash. Obsns.* 1885)...Sadler (*Ast. Reg.* **XIX**, 65)...Lv1...Big...Maw (**I**)...*Proc. Haverford Coll. Obsy.* 1891...Glasenapp (**II**)...Cohn (3240)...Ebell (3321)...Knorre (3518)...Solá (3563)...Bryant (*Mon. Not.* **LXI**, 486)...*Annals Toulouse Obsy.* **III**...Sk5...Biesbroeck...β6...]

2903. **OΣ 114.** Without change. 34 46

1867.95	279°3	2″79	3*n*	Δ
1898.80	280.1	2.83	4*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Ma (**XI**)...T (3186)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

34^m 48^s **2904.** **Σ** 768 *rej.* The only measures are:

1905.03	220°.9	18″.62	1*n*	β^6	7.0...9.6

34 48 **2905.** **β** 14. Discovered with the 6-inch. Unchanged.

1874.17	194°.8	5″.78	1*n*	OΣ
1891.90	194.5	5.79	2*n*	β

[β (I)....β (*Mon. Not.* **XXXIII**, 351)....β (3114) (*Pub. L. O.* **II**)....OΣ (X)....Δ (I)...]

34 54 **2906.** **Σ** 772. Fixed.

1867.22	243°.1	29″.84	3*n*	Δ
1893.13	242.7	29.66	2*n*	Gla
1905.03	243.0	30.04	1*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...Δ (1736)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

34 55 **2907.** **Σ** 773. (AB = **Doolittle** 8.) Companion not seen by Δ 1864.78; very plain with 6-inch, February 1876, but an insignificant pair. In the field *sf* a 7m star. Doolittle has added a nearer star, 12.2m, not previously seen. There is no change in the Struve companion.

AB	1899.88	252°.5	14″.01	2*n*	Doo
AC	1899.88	219.5	27.27	2*n*	Doo

[Δ (1736)...Ma (*F. S.* **II**)...Glasenapp (**IV**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

35 4 **2908.** **Ho** 509. The only other measure is:

1898.06	203°.7	11″.66	5*n*	Doo

[Ho (3557)...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1066)

35 37 **2911.** **A** 116. Discovered at the Lick Observatory. No other measures.

[A (*Bul. L. O.* No. 3) (*A. N.* 3741)...]

35 38 **2912.** **Kr** 27. Noted as double in *A. G. Hels.* No other measures.

[β (3042) (*Pub. L. O.* **II**)...]

35 39 **2913.** **β** 1052. Discovered with the 36-inch. Probably without change. In Gould 6.7m; in SD 7.5. The following are all the later measures:

1890.13	191°.1	0″.47	3*n*	Sp
1892.00	192.6	0.48	6*n*	Sp
1898.19	188.6	0.70	2*n*	A

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...Sp (**III**)...A (3584)...]

35 39 **2914.** **Σ** 776. Unchanged.

1869.04	102°.5	2″.20	4*n*	Δ
1893.14	106.3	2.36	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...T (3185)...Glasenapp (**II**)...]

2915. **Σ** 769. Probably fixed. The principal star is given a proper motion of 0″.069 in 360° (*A. G. Harvard*). 35^m 45^s

1867.15	172°.1	4″.01	3*n*	Δ
1905.03	171.3	4.04	1*n*	β

[H (V)...Ma (*F. S.* I)...Δ (II)...β^6...]

2917. **Σ** 775. Unchanged. 36 0

1867.89	66°.9	22″.72	4*n*	Δ
1878.90	66.6	22.81	2*n*	β
1905.03	66.4	22.31	1*n*	β

[Ma (*F. S.* **II**)...Δ (II)...β^3...β^6...]

2919. **Σ** 777. (= **H** 371.) Fixed. 36 7

1869.22	85°.1	4″.47	4*n*	Δ
1900.32	85.1	4.68	2*n*	Barnard

[Ma (**XI**)...Δ (II)..Glasenapp (**II**)...]

2920. **Σ** 778. Fixed. 36 21

1866.87	183°.8	3″.12	3*n*	Δ
1905.03	185.0	3.06	1*n*	β

[Ma (*F. S.* I)...Ma (**XIII**)...H (**VII**)...Wr...Δ (II)...Se...β^6...]

2923. **Σ** 782. B is W^1 V. 904. Distance increasing from proper motion of one of the stars of 0″.060 annually. 36 47

1831.16	309°.4	36″.16	3*n*	Σ
1866.66	308.6	38.63	3*n*	Δ
1879.68	307.5	39.15	3*n*	β
1897.72	307.6	40.64	5*n*	Doo
1904.03	307.6	40.59	3*n*	β

[Ma (*F. S.* **II**)...En...Δ (1735)...Δ (**II**)...Pt...Flm...β^3...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

2924. **Σ** 779. Without change. In his second measure (1867.69) Dembowski suspected an elongation of A, but not verified later. The Struve stars are unchanged. The large star has a proper motion of 0″.033 in 307°.0 (Battermann). 36 48

1868.83	253°.1	8″.58	4*n*	Δ
1903.82	253.8	8.43	2*n*	β

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...Δ (II)...β^6...]

2925. **A** 117. A 14.5m star, 191°: 26″. No other measures. 36 51

[A (3741) (*Bul. L. O.* No. 3)...]

2926. **Σ** 3115. Apparently slow angular motion, without change in distance. 36 57

1853.30	30°.1	1″.43	4*n*	OΣ
1868.67	27.7	1.42	5*n*	Δ
1883.56	23.5	1.54	6*n*	En
1889.27	24.0	1.48	3*n*	Maw

[Ma (*F. S.* I)...OΣ (**IX**)...Δ (1125, 1736)...Δ (I, p. 118) (**II**)...Flm...Bl (**V**)...β^2...En (2663)...Big...Maw (I)...Jp (3802)...]

37^m 0^s **2927.** Σ 783. Both white, Se. Probably fixed.

1867.26	357°6	9″34	3*n*	Δ
1905.03	360.5	9.29	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...OΣ (IX)...Se...Δ (II)..β^6...]

37 19 **2929.** β 752. This 7½ m star was suspected to be a very close pair, 120°: 0″5, with the 6-inch on Mt. Hamilton in 1879. It was examined (1890.66) with the 36-inch, and it was certainly single then with the highest powers. There are no other observations of it, negative or otherwise. It is possible that the apparent elongation was an illusion, but it should be examined further.

[β (XI)...β^2...β (3048) (*Pub. L. O.* I, II)...]

37 24 **2931.** A 118. Discovered at the Lick Observatory by Aitken (3741) (*Bul. L. O.* No. 3).

37 26 **2932.** Σ 781. Without change. In DM 9.3 m.

1868.37	120°5	14″91	4*n*	Δ	9.1...10.2
1903.83	119.9	15.36	2*n*	β	9.3...10.0

[Ma (*F. S.* I)...Δ (II)...β^6...]

37 28 **2933.** A 496. Discovered by Aitken (*Bul. L. O.* No. 50.)

37 35 **2934.** Σ 760 *rej.* The only measure is:

1905.03	46°8	26″13	1*n*	β^6	8.5...9.8

37 40 **2936.** OΣ 115. No sensible change in the close pair. These stars have a proper motion of 0″035 in 135°4 (Porter).

1869.95	122°3	0″89	5*n*	Δ
1898.34	120.7	0.73	7*n*	Hu

There is a distant 11 m star:

1850.92	255°4	93″82	1*n*	OΣ
1884.15	256.3	92.47	1*n*	HΣ
1904.04	256.3	92.60	2*n*	β

[OΣ (IX) (X, p. 68)...Δ (I)...Sp (II)...T (3186)...Brown (3645)...Hu (*A. J.* 427) (*Pub. L. O.* V)...β^6...]

38 24 **2940.** Σ 788. (= H II. 61.) Fixed.

A and B

1867.10	89°9	7″31	3*n*	Δ
1904.02	89.2	7.36	2*n*	β

A and C

1867.10	147°3	35″88	3*n*	Δ
1904.02	147.9	35.71	2*n*	β

[Ma (XI)...Ma (*F. S.* I)...Δ (II)...β^6...]

38 29 **2941.** Σ 785. (AC = OΣ 116.) No change in either companion. T measures a faint pair in the field *n*, 250°4: 6″89: 10.0...11.7 (1890.15) 2*n*.

A and B

1866.14	347°8	13″86	4*n*	Δ
1890.02	347.2	13.68	3*n*	Giacomelli
1898.85	347.6	14.26	3*n*	Hu

A and C

1890.17	67°0	18″35	3*n*	T
1898.85	65.2	18.11	3*n*	Hu

[Ma (*F. S.* I)...Ma (XI, XIII, XV)...Ba (I)...Ra (XXVII)...Δ (1204)...Δ (I, p. 227) (II)...OΣ (IX)....Gl...T (3185)...T (3186, pp. 291, 299)...Giacomelli (I)...Glasenapp (II)...Hu (*Pub. L. O.* V)...*Annals Toulouse Obsy.* III...]

38^m 40^s **2942.** H —. This is No. 783 of H^8. The only later measures are:

1903.86	280°8	26″80	2*n*	β^6	9.1...9.1

38 42 **2943.** Σ 789 *rej.* The only later observation is:

1905.03	149°5	17″51	1*n*	β^6	7.0...10.0

38 50 **2945.** Σ 787. The measures are very inconsistent, but on the whole there is no evidence of motion. AC 50°: 11″ (Hall).

1869.18	75°4	1″24	4*n*	Δ
1880.06	71.0	1.21	2*n*	Hl
1890.16	74.5	1.34	4*n*	T
1890.17	73.9	1.12	2*n*	Hl

[Ma (*F. S.* I)...Ma (XI, XII, XIII, XV)...Wn (1738)...Flm...Gl...WS^2...Δ (II)...Wn (V)...En (2663)...Hl (I, II)...Big...T (3185)...Glasenapp (II)...Big (*Bul. Ast.* XII, 299)...]

38 52 **2946.** Σ 786. Unchanged.

1869.37	334°5	5″93	4*n*	Δ
1905.03	336.3	5.85	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β^6...]

38 57 **2947.** Σ 780. No sensible change in either companion.

AB	1869.46	103°9	3″70	5*n*	Δ	
	1904.99	103.5	4.37	1*n*	β	
AC	1868.29	152.8	10.97	4*n*	Δ	
	1904.99	150.0	11.45	1*n*	β	
AD	1904.99	53.1	17.98	1*n*	β	...13.5

[Ma (*F. S.* I)...Ma (XI)...Se...Δ (1204)...Δ (I, II)...Ra (XXIII)...Do (2989)...β^6...]

39 27 **2948.** γ *Leporis.* S 498. (= H V. 50 = H VI. 40.) A remarkable system from the large common proper motion of the stars. The latest values from the meridian positions are given by Porter:

A = 0″475 in 220°0
B = 0.473 in 222.2

The companion is Lalande 10931. The magnitude in SD is 6.9.

1889.19	349°6	95″25	2*n*	Hl
1897.71	349.5	95.23	5*n*	Doo
1905.09	349.8	94.94	2*n*	β

[Pk...Hl (II)...Doolittle (*Pub. Flower Obsy.* I)...β^6...]

$39^{m}\ 31^{s}$ **2949.** **H** 3791. (= **Hd** 79.) A recent examination of this star, since Part I was in type, shows that the place given there, which was taken from Cin⁴, is erroneous. This star is SD (20°) 1163, and the place is:

$$\left.\begin{array}{l}\text{R. A.} = 5^{h}\ 38^{m}\ 11^{s}\\ \text{Decl.} = -20^{\circ}\ 43'.2\end{array}\right\}$$

The only later measures are:

1877.12	57°.5	10″.78	3*n*	Cin⁴	7.8...9.0
1905.11	58.9	10.46	2*n*	β⁶	

39 41 **2951.** **H** 709. "A most minute object." The only measure is:

1901.80	130°.2	5″.31	1*n*	β⁶	11.0...12.5

39 41 **2952.** **Ho** 336. The only later measure is:

1897.80	237°.4	19″.75	1*n*	See

[Ho (3233)...See (3495)...]

(See p. 1066)

39 45 **2953.** **Hn** 77. Discovered by Holden at the Washburn Observatory.

[Hu (*Pub. Washburn Obsy.* II)...Com (VI)...]

39 53 **2954.** *Δ* 9. Discovered by Dembowski when observing OΣ (App) 66, which closely follows.

1898.09	271°.3	1″.53	3*n*	Doo

[*Δ* (I, p. 373)...Doolittle (*Pub. Flower Obsy.* I)...]

39 55 **2955.** **Ho** 19. The only later measures are:

1904.05	346°.3	7″.07	2*n*	β

[Ho (2778)...β⁶...]

(See p. 1066)

40 6 **2957.** *Orionis* 187. **Σ** 790. (= **S** 497.) Fixed.

1866.39	89°.3	6″.81	3*n*	*Δ*
1884.56	88.2	6.95	2*n*	Wilson
1905.07	89.7	6.82	1*n*	β

[Ma (*F. S.* I)...Ma (XIII)...WJ...Cin⁴...Cin⁶...*Δ* (II)...Wilson (Cin¹⁰)...β⁶...]

40 19 **2959.** 29 *Camelopardali.* **♅ IV.** 125. (= **H** 2278.) As H 2278 it is described "a curious combination; a large star followed by five small ones, all in an exact straight line but C, which is one-half its diameter to the *sp*. Dist. 18″, 50″, 100″, 130″." No magnitudes given by H. The principal star has a proper motion of 0″.027 in 244°.0 (*A. G. Hels.*).

1900.78	130°.7	24″.90	2*n*	β	...9.7

[Espin (3717)...β⁵...]

40 28 **2960.** **OΣ** 117. Without change.

1869.90	29°.8	11″.51	4*n*	*Δ*	6.8...9.7
1883.32	31.0	11.94	6*n*	En	7.1...9.8
1898.61	29.5	11.82	3*n*	Hu	

[OΣ (IX) (X, p. 191)...*Δ* (I)...Ma (XI, XIII)...En (2678)...Hu (*Pub. L. O.* V)...]

2961. **β** 91. Discovered with the 6-inch, Probably without change. The later measures are: $40^{m}\ 29^{s}$

1891.93	80°.9	1″.75	3*n*	β
1899.95	90.6	1.43	1*n*	Lewis

[β (II)...β (*Mon. Not.* XXXIII, 437)...β (3113) (*Pub. L. O.* II)...*Δ* (I)...Lewis (*Mon. Not.* LX, 498)...]

2962. Measured in looking for No. 2942. Probably this is Σ 767 *rej.* Cl. II, 8-9...8-9, which Herschel was looking for and could not find when No. 2942 was observed. 40 32

2963. **OΣ (App)** 66. No change. The principal star is given a proper motion of 0″.042 in 326°.5 (*A. G. Berlin*) 40 33

1890.95	165°.7	93″.98	4*n*	Franz
1904.99	165.5	94.53	1*n*	β

[*Δ* (I)...Franz (3464)...β⁶...]

2964. **β** 559. This is in the nebula, Messier 78. The wide stars had been remarked by H. The close pair was discovered with the 18½-inch. There is no evidence of motion. All the later measures are given. 40 36

A and B

1891.93	84°.2	1″.96	2*n*	β
1898.73	86.4	2.10	1*n*	β

A and C

1891.92	201°.9	50″.34	3*n*	β
1898.73	201.4	50.35	1*n*	β

[β (X)...β¹...β³...β (3114) (*Pub. L. O.* II)...]

2965. **β** 892. Discovered with the 18½-inch. It is 12ˢ *f* 130 *Tauri.* The later measures are: 40 40

1891.89	276°.2	1″.15	2*n*	β
1901.61	273.3	1.25	4*n*	Doo

[β (XIII)...β³...β (3114) (*Pub. L. O.* II)...Doolittle (*A. J.* 547)...]

2967. **Σ** 792. Fixed. 40 47

1867.40	133°.1	25″.05	3*n*	*Δ*
1905.05	132.7	24.87	1*n*	β

[Ma (*F. S.* II)...En...*Δ* (II)...β⁶...]

2968. τ *Aurigae.* **β** 192. (AC = **♅** V. 21 = σ 205.) The nearest companion to τ *Aurigae* was noted with the 6-inch. The principal star has a proper motion of 0″.043 in the direction of 239°.4 (Auwers). 40 52

A and B

1892.03	352°.0	39″.29	2*n*	β
1898.75	352.0	39.28	2*n*	β

A and C

1892.03	33°.3	47″.96	2*n*	β
1898.75	34.0	48.52	2*n*	β

[β (IV)...β (*Mon. Not.* XXXIV, 382)...β (3141) (*Pub. L. O.* II) (*Pub. Y. O.* I)...]

40^{m} 54^{s} **2969.** 133 *Tauri.* **H 3279.** The only measures are:

A and B

1877.87	298°6	17″87	1*n*	β^{1}	
1903.83	297.0	17.85	2*n*	β^{6}	...12.4

A and C

1877.87	181°2	24″95	1*n*	β^{1}	
1903.83	182.2	25.34	2*n*	β^{6}	...12.2

40 57 **2970.** **β 92.** Discovered with the 6-inch. Relatively fixed. The later measures are:

1890.15	171°7	8″59	3*n*	T	
1892.03	169.9	9.24	2*n*	β	8.6...9.6
1892.16	170.3	9.12	2*n*	T	

[β (**II**).... β (*Mon. Not.* **XXXIII**, 437) .... β (3141) (*Pub. L. O.* **II**) .... Δ (**I**) .... T (3186)...]

(See p. 1066)

41 13 **2972.** **OΣ 118.** (AC = **OΣ** (App) 67.) **B. A. C.** 1835. The larger star has a proper motion of 0″023 in 282°6 (*A. G. Berlin*). No material change.

A and B

1867.94	317°8	0″72	3*n*	Δ
1891.99	318.6	0.70	3*n*	β
1899.49	321.5	0.64	3*n*	Hu

AB and C

1869.80	161°3	75″57	3*n*	Δ
1891.97	161.5	75.30	2*n*	β
1899.49	161.6	75.41	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...OΣ (**X**)...T (3186)...β^{3}...β (3114) (*Pub. L. O.* **II**) ... Franz (3464) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXIII**, 403; **LXIV**, 793)...Hu (*Pub. L. O.* **V**)...Renz (*Bul. St.P. Acad.* 1892)..Coleman (*Mem. R. A. S.* **LIV**)...]

41 15 **2973.** Measured by β^{5} in looking for H 5465 (No. 2982).

41 18 **2974.** **β 561.** Noted with the 18½-inch in looking for H 5465 (No. 2982).

1892.00	3°4	19″47	3*n*	β
1899.95	1.4	19.32	3*n*	Doo
1901.13	3.0	19.04	3*n*	β

[β (**X**)...β^{1}...β (3114) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^{5}...]

41 24 **2975.** **OΣ 119.** Change in angle is probable.

1870.94	316°2	0″57±	5*n*	Δ
1878.10	315.4	0.69	2*n*	β
1898.10	321.6	0.90	2*n*	Doo
1898.39	323.6	0.71	6*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Flm...Do (2322)...β^{1}...HΣ (**XII**)...Hu (*A. J.* 427)...Doolittle (*Pub. Flower Obsy.* **I**)...Brown (3645)...Hu (*Pub. L. O.* **V.**) ...Bryant and Bowyer (*Mon. Not.* **LXII**, 383; **LXIV**, 793)...]

41 33 **2976.** 52 *Orionis.* **Σ 795.** (= **H** I. 20 = **S** 499.) Later observers make the angle a little larger. The proper motion is insensible, 0″009 in 102°6 (Auwers).

1854.06	205°1	1″56	6*n*	OΣ
1869.14	203.9	1.61	4*n*	Δ
1887.12	204.7	1.67	2*n*	T
1894.14	204.7	1.34	2*n*	HΣ
1903.25	207.3	1.54	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (324)... Ma (**XIII**)...WJ... Se... Se^{3}...Kn...Ra (**XXIII**)? ...P^{1}...Δ (1204)...Δ (**I, II**)...OΣ (**IX**)... Maw (**I**)...T (2898)... Je (2449) ...Glasenapp (**II**)... Scott (*Mon. Not.* **LIX**, 427)... Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**).. Biesbroeck...]

2977. **β 560.** Discovered with the 18½-inch. A binary in retrograde motion. The following are all the measures: 41^{m} 37^{s}

1877.88	208°2	0″94	1*n*	β
1889.66	178.2	0.6±	2*n*	Sp
1891.15	174.0	0.58	4*n*	Sp
1892.10	172.4	0.60	4*n*	β
1895.06	155.3	0.52	1*n*	Lewis
1898.12	167.5	....	1*n*	Bowyer
1898.59	163.3	0.69	2*n*	Lewis
1898.88	165.8	0.75	2*n*	Hu
1899.00	166.6	1.02	1*n*	β
1899.04	161.5	0.83	1*n*	Cowell
1900.83	165.6	0.74	3*n*	A
1901.09	166.7	0.69	2*n*	Bryant
1902.62	153.2	0.71	2*n*	Lewis
1903.71	161.8	0.75	4*n*	Biesbroeck

Lewis (*Mon. Not.* LXIV, 793) measures a pair of small stars which should be 2′ *s* of β 560:

1903.19	165°0	3″93	2*n*	Lewis	8.8...9.8

[β (**X**)...β^{1}...β (3141) (*Pub. L. O.* **II**)...Sp (**III**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 405; **LX**, 498; **LXII**, 383; **LXIII**, 403; **LXIV**, 793)...Hu (*Bul. L. O.* No. 44)...A (*Bul. L. O.* No. 11)...Biesbroeck...]

2978. **Σ 791.** No change. 41 42

1867.81	90°4	4″67	3*n*	Δ
1894.99	90.9	4.96	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...β^{6}...]

2979. **β 93.** The distant triple companion was noted with the 6-inch. It is not likely to have any special interest. 41 44

AB	1898.85	121°7	60″07	2*n*	β
BC	1898.92	162.3	5.46	1*n*	β
BD	1898.92	326.2	9.74	1*n*	β

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

2980. **β 15.** Discovered with the 6-inch. Apparently without change. Later measures are: 41 45

1878.12	177°9	1″67	1*n*	Cin
1886.89	179.8	2.08	2*n*	LM
1898.84	178.7	2.05	1*n*	Cg

[β (**I**)... β (*Mon. Not.* **XXXIII**, 351) ... Δ (**I**) ... Cin^{5}... LM ... Cogshall (*A. J.* 478)...]

2981. **S 500.** The components are Lalande 10961 and 10963. The only measures since 1825 are: 41 53

1901.79	89°2	59″97	2*n*	β^{5}	8.5...8.5

$42^m\ 5^s$ **2982.** **H** 5465. "An excessively minute companion suspected. Position by diagram, much defaced." Never able to see any companion with the 6-inch in 1873–74, nor with the 18½-inch in 1878. Nothing seen on two nights with the 40-inch, 1900–01. Herschel's place is that of the 7.5 m star, DM (11°) 945.

[β (*Mon. Not.* **XXXIV**, 372) . . . β^5 . . .]

42 6 **2983.** **Σ** 797. No material change.

1866.29	17°0	7″10	3*n*	Δ
1904.02	16.5	7.12	2*n*	β

[Ma (*F. S.* **I**) . . . H (**V**) . . . Ma (**XI**) . . . Δ (**II**) . . . β^6 . . .]

42 7 **2984.** **Σ** 796. (= H̥ I. 67.) Fixed.

1868.48	62°4	3″65	4*n*	Δ
1893.06	64.0	3.53	2*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . **H**^{1} . . . H (**VII**) . . . Da^2 . . . Da^3 . . . Wr . . . Se . . . Ra (**XXIII**) . . . WS . . . Gl . . . Bl (**V**) . . . Δ (1118) . . . Δ (**I, II**) . . . Maw (**I**) . . . Glasenapp (**II**) . . .]

42 17 **2985.** **H** 3798. The only later measures are:

1877.13	68°8	8″84	2*n*	Cin^4	8.0 . . . 8.4
1905.11	69.4	15.00	2*n*	β^6	8.0 . . . 8.7

The micrometer-screw readings in Cin^4 give entirely different distances for the two measures, and both are apparently wrong. The meridian positions in Cordoba G. C. give, 67° : 16″1 (1880.9). There is a new pair $2^m\ 9^s$ *f* and 2′6 *n*, not in Part I.

1905.14	65°6	2″24	1*n*	β^6	8.5 . . . 10.0

42 22 **2986.** **β** 405. Noted with the 6-inch. Without change. The later measures are:

1892.04	126°8	14″45	2*n*	
1899.11	126.7	14.13	2*n*	β

[β (**VII**) . . . β (2103, 3141) . . . β1 . . . β (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . .]

42 25 **2987.** **Σ** 798. (= **S** 501.) Fixed. Dembowski suspected a third star 10″, distant, in 1864, but not afterwards verified, and not seen with the 40-inch.

1867.27	181°2	21″10	3*n*	Δ
1900.77	181.0	20.90	2*n*	β

[Ma (*F. S.* **II**) . . . En . . . Δ (**II**) . . . β^5 . . .]

42 25 **2988.** **A. G.** 100. Double in *A. G. Berlin*, but single 1903, Miller and Cogshall (*A. J.* 546).

42 39 **2990.** **Σ** 794. Fixed. This is DM (48°) 1314.

1868.54	314°1	9″47	4*n*	Δ
1904.99	313.0	9.40	2*n*	β

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . Bl (**V**) . . . β^6 . . .]

2992. **Σ** 801 *rej.* Identified by me (1876) and estimated, 325° : 20″ : 8 . . . 9.5. In W^1 8m. H (VIII) has an observation of a pair exactly in this place, 120°9 : 20″ ± : 10 . . . 10 (1834+), which I could not find. The discrepancy in magnitudes is noticed by him. Probably the same with error of 180°. $42^m\ 56^s$

1905.05	326°6	26″85	1*n*	β^6	7.5 . . . 10.0

2993. **Hn** 78. From *Pub. Washburn Obsy.* II. 42 57

[Com (**VI**) . . .]

2995. **β** 406. Discovered with the 6-inch. In the field with **Σ** 801 *rej.* 43 1

1892.00	242°3	11″39	3*n*	β
1899.11	244.4	11.33	2*n*	β

[β (**VII**) . . . β1 . . . β (2103, 3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . .]

2996. *ν Aurigae.* H̥ V. 90. (= σ 208.) There is an error in Herschel's angle. As printed it corresponds to 61°8 *sp.* Assuming this to be 61°8 *np*, it agrees very nearly with the present position. The large star has a proper motion of 0″030 in 304°8 (Auwers). 43 10

1878.32	206°8	54″65	2*n*	β	. . . 9.5
1898.00	206.7	55.16	3*n*	Doo	

[Sadler (*Mon. Not.*, Jan., 1879) . . . β1 . . . β3 . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

2997. **H** 3799. "Very elegant double star." The only measure is: 43 11

1877.11	149°1	4″25	1*n*	Cin^4	8.0 . . . 8.3

2998. **A** 500. (AB = **Σ** 804 *rej.*) No other measures of the **Σ** pair: 43 14

[A (*Bul. L. O.* No. 50) . . .]

2999. **H** 710. "Points to 14 m star 30″." 43 21

3000. **H** 712. The only measure is from *A. G. Leipzig*, p. 247: 43 21

1895.29	264°3	10″07	1*n*	9.2 . . . 9.6

3002. **Schj.** 3. These stars are SD (4°) 1251 and 1249. 43 43

1905.05	318°0	62″86	1*n*	β^6	8.5 . . . 9.7

3003. **Σ** 799. The measures are insufficient to determine the question of change. Later observers give a smaller position-angle. 43 57

1859.94	197°3	1″20	1*n*	Se
1869.12	186.1	1.06	4*n*	Δ
1870.26	188.7	1.12	2*n*	OΣ
1899.01	180.3	0.93	6*n*	Doo
1903.16	184.1	1.02	2*n*	Bowyer

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . OΣ (**IX**) . . . Δ (2194) . . . Δ (**II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 793) . . . HΣ (**XII**) . . .]

44^{m} 6^{s} **3006.** **Σ 802.** Unchanged.

1866.88	107°0	3″06	3*n*	Δ
1904.99	107.1	3.15	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...β⁶...]

44 6 **3007.** **Σ 806.** Probably without change.

1867.71	199°9	10″68	3*n*	Δ
1893.12	201.2	10.70	2*n*	Gla

[Ma (*F. S.* **I**)...H²...H (**VI**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...]

44 9 **3008.** *Leporis* 61. **β 94.** Discovered with the 6-inch. Evidently without change. This star is Lalande 11086.

In 1846 Jacob found a pair, the rough place of which reduced would give for 1880, R. A. 6^{h} 5^{m} : Decl.—14° 35′ (*Mem. R. A. S.* XVII). He states that he subsequently looked for it several times, and could not find it. From a careful search I am certain there is no such pair in or near his place. There is no doubt now of its identity with β 94, Jacob having made an error of about 20^{m} in his R. A. This is confirmed by his description of the pair, 184°0 : 1″8± : 6½...9.

1876.16	179°4	2″73	4*n*	Δ
1881.14	182.5	2.72	1*n*	β
1888.49	179.7	2.61	2*n*	T
1892.99	178.6	2.48	2*n*	J
1898.84	180.1	2.56	1*n*	Cg

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β³...Δ (**I**)...Cin⁵...Lv¹...T (2991)...Jones (*Proc. Haverford Coll. Obsy.*, 1892)...Cogshall (*A. J.* 478)...Do (3798)...Lunt (*Mon. Not.* **LXI**, 584)...]

44 12 **3010.** **Σ 805.** Without change.

1867.16	49°4	12″11	3*n*	Δ
1904.99	48.4	12.26	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...β⁶...]

44 13 **3012.** **Σ 803** *rej.* In the field with Σ 802.

1904.99	34°9	11″05	1*n*	β⁶	9.5...12.0

44 17 **3013.** **Ku 24.** (= **Hu 558.**) The later measures are:

1902.71	260°2	1″50	3*n*	Hu	9.0...10.0

[Ku (3821)...Hu (*Bul. L. O.* No. 27)...]

44 20 **3014.** **A. G. 101.** Double in *A. G. Lund.* Measures by β⁶. There is another pair of small stars 33^{s} *f* and about 5′ *n*.

1904.01	287°9	13″32	1*n*	β⁶	9.8...10.5

This latter pair appears to be the one referred to by Herschel in his observations of Biela's comet, and given, 103°3 : 15″± : 8...9.

[β⁶...Ku (3821)...H (*Mon. Not.* **II**, 118)...]

3015. **β 1188.** (AC = **Σ 809.**) The principal star of Σ 809 was found to be double with the 36-inch. 44^{m} 33^{s}

There is no material change in the Σ companion. The following are the other measures of AB:

A and B

1893.22	105°5	1″05	1*n*	Sp
1898.77	104.5	1.02	2*n*	β
1898.88	103.1	1.43	1*n*	A

A and C (= Σ 809)

1868.56	99°6	25″25	4*n*	Δ
1879.02	98.3	25.22	2*n*	β
1890.85	98.3	25.32	3*n*	β
1898.77	97.8	24.98	2*n*	β
1898.88	98.2	25.00	1*n*	A

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...β³...Sp (**III**)...A (3584)...Ma (*F. S.* **II**)...En...Δ (**II**)...]

3017. **Σ 807.** Some change in the angle is probable. 44 54

1868.07	143°8	2″32	4*n*	Δ
1878.91	146.2	2.32	1*n*	β
1895.25	148.0	2.28	2*n*	HΣ
1897.68	143.9	2.49	5*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VII**)...Δ (**II**)...Gl...β³...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

3018. **O. Stone 12.** Discovered by Stone at Cincinnati. 44 59: Approximate place and measures from Cin³.

3019. Δ 10. (AC = **Σ 808.**) There is no change in the 45 6 Σ companion. The close star was discovered by Dembowski in 1869. The only other measures are:

A and B

1878.38	165°9	2″60	2*n*	β
1897.34	163.2	2.57	6*n*	Doo

A and C

1867.26	57°8	16″07	3*n*	Δ
1878.91	57.6	16.38	1*n*	β
1897.34	58.6	16.02	6*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1979)...Δ (**II**)...β¹...β³...Doolittle (*Pub. Flower Obsy.* **I**)...]

3020. *Aurigae* 146. **β 1053.** Discovered with the 36- 45 18 inch. Lalande 11066. In Lalande 6½ m, and 6.8 in DM. No other measures. The angle in *Pub. Yerkes Obsy.* I is printed 233°2; it should be 283°2.

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...]

3022. 136 *Tauri.* **β 1054.** Discovered with the 36-inch. 45 47 The proper motion of this star is 0″021 in the direction of 172°8 (Auwers). The only later measure is:

1898.94	232°7	15″01	2*n*	β

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

$45^{m}\ 52^{s}$ **3023.** OΣ 120 *rej.* B is Rad^1. 1569. The other measures are:

1843.27	132°.7	43″.73	1*n*	Ma
1898.90	136.0	44.90	3*n*	Hu

[Ma (**XI**) . . . Δ (I) . . . Hu (*Pub. L. O.* **V**) . . .]

45 53 **3024.** **See 56.** The later measures disagree in angle and distance.

1899.23	254°.1	6″.12	3*n*	Cogshall

[See (*A. J.* 431) . . . Cogshall (*A. J.* 505) . . .]

46 5 **3026.** **Weisse 11.** Noted "duplex 20″," in Weisse. The only measures are:

1904.99	164°.1	24″.78	1*n*	β^6	9 . . . 9

46 6 **3027.** Discovered by Doolittle. Not in *Pub. Flower Obsy.* I.

46 6 **3028.** **Σ 813.** Fixed.

1867.76	146°.7	3″.08	3*n*	Δ
1893.14	148.0	2.98	2*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . H (**V**) . . . Se . . . En (1673) . . . Ra (**XXIV**) . . . Δ (1185) . . . Δ (**I, II**) . . . T (2898) . . . Glasenapp (**II**) . . .]

46 9 **3029.** **β 95.** Discovered with the 18½-inch; *nf* 55 *Orionis.* Probably fixed.

1892.00	296°.1	13″.89	2*n*	β

[β (**II**) . . . β (*Mon. Not.* **XXXIII**, 437) . . . β (3114) (*Pub. L. O.* **II**) . . .]

46 13 **3030.** 56 *Orionis.* Measures from β^5 Taken for 59 *Orionis.* No other observations.

46 33 **3031.** **Σ 811.** No evidence of change.

1866.65	232°.2	5″.02	3*n*	Δ
1895.25	232.3	5.03	2*n*	HΣ

[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . Gl . . . Δ (**II**) . . . HΣ (**XII**) . . .]

46 56 **3032.** **Σ 810.** (= **H 2282.**) This is DM (52°) 1013. Fixed.

1869.11	243°.6	2″.64	4*n*	Δ
1897.02	242.7	3.07	2*n*	Doo

[Ma (*F. S.* **I**) . . . Δ (**II**) . . .]

47 32 **3033.** **OΣ 123.** No material change.

1868.86	178°.1	2″.29	4*n*	Δ
1891.09	178.8	2.26	2*n*	HΣ
1898.56	181.2	2.20	3*n*	Hu

[OΣ (**IX**) . . . Ma (**XI**) . . . Δ (I) . . . T (2899) . . . *A. G. Leipzig*, p. 207 . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . .]

3035. **OΣ 122.** (= **β 562** *rej.*) Found independently and inadvertently included as β 562 of my Tenth Catalogue. Dembowski in 1865 noted a doubtful elongation in 135°. Some change in the angle is probable. $47^{m}\ 41^{s}$

1843.24	117°.8	0″.22	2*n*	Ma
1852.27	138.9	0.2 ±	1*n*	Ma
1878.84	117.7	0.29	1*n*	β
1883.65	129.2	0.25 ±	6*n*	En
1891.15	128.9	0.3 ±	1*n*	Sp
1899.42	133.1	0.29	3*n*	Hu

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Δ (**I**, p. 228) . . . Flm . . . β^1 . . . β^3 . . . En (2678) . . . Sp (**III**) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**, pp. 143, 186) . . .]

3036. **β 563.** Discovered with the 18½-inch. Probably fixed. 47 44

1886.18	184°.5	6″.50	1*n*	HΣ
1892.00	185.2	6.52	3*n*	β
1898.77	183.3	6.81	3*n*	β
1899.96	182.8	6.63	4*n*	Doo

[β (**X**) . . . β^1 . . . β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

3037. **S 502.** (= **OΣ (App) 68.**) Unchanged. 47 56

1874.99	130°.3	45″.66	3*n*	Δ	7.4 . . . 7.8
1877.64	130.6	45.46	2*n*	OΣ	7.8 . . . 8.0
1886.06	130.2	45.44	2*n*	Eng	

[H (**VI**) . . . OΣ (**X**, p. 13) . . . Δ (**I**) . . . Engelhardt (2785) (**II**) . . .]

3038. **Ho 20.** The only later measure is: 48 6

1894.18	275°.9	7″.50	1*n*	Ho

[Ho (2778, 3558) . . .] (See p. 1066)

3039. **Σ 815.** Dembowski measures a third star 8.5 m, 306°.5 : 88″.61 (1864.94) 1*n*. 48 12

1867.27	137°.6	12″.88	3*n*	Δ
1895.29	139.8	13.47	1*n*	Leip
1905.07	136.6	12.98	2*n*	β

[Ma (*F. S.* **I**) . . . H (**V**) . . . Ma (**XI**) . . . Δ (**II**) . . . *A. G. Leipzig*, p. 247 . . . β^6 . . .]

3040. **Innes 348.** Magnitude of A from O. Arg. S. 48 12

[Innes (*Mon. Not.* **LXI**, 584; **LXII**, 473) . . .]

3041. **Σ 784.** No recent measures. 48 19

1867.80	192°.7	1″.32	3*n*	Δ
1879.70	193.3	1.37	1*n*	β
1882.10	195.4	1.47	1*n*	Big

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . β^2 . . . Big . . .]

3043. **Σ 817.** (= **H IV. 98.**) Fixed. 48 23

1866.91	72°.5	18″.52	3*n*	Δ
1893.18	72.3	18.57	3*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII, XV**) . . . En . . . Gl . . . Δ (**II**) . . . T (2898) . . . Glasenapp (**II**) . . .]

$48^m\ 27^s$ **3045.** **Ho 337.** (AB = **H** 373.) Close pair discovered by Hough. The only other measure of AB is:

1890.20	112°.6	9″.54	2*n*	Ho	8.5...9.0

[Ho (3233)...]

(See p. 1066)

48 30 **3047.** **Σ 816.** Unchanged.

1868.74	289°.3	4″.36	4*n*	Δ
1887.93	288.8	4.23	2*n*	T

[Ma (*F. S.* I...Ma (XI)...Δ (II)...T (2898)...]

48 40 **3048.** *a Orionis.* (AE = **H VI. 39.**) The small star D was added with the 18½-inch, and B and C with the 36-inch. The only other measures of the first are:

1877.96	348°.0	77″.59	3*n*	β

The proper motion of the large star is 0″.025 in 27°.5 (Auwers). The latest measure of the Herschel star is:

1905.03	152°.7	175″.92	1*n*	β

[β1...β (3114) (*Pub. L. O.* II)...Sadler (*Mon. Not.*, Jan., 1879)...Pk...β6...]

(See p. 1066)

48 57 **3050.** **Σ 818.** Fixed.

1867.67	274°.3	5″.89	3*n*	Δ
1905.03	273.3	5.85	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β6...]

48 58 **3051.** **Σ 819.** Fixed.

1868.98	96°.9	25″.33	4*n*	Δ
1905.03	97.5	25.30	1*n*	β

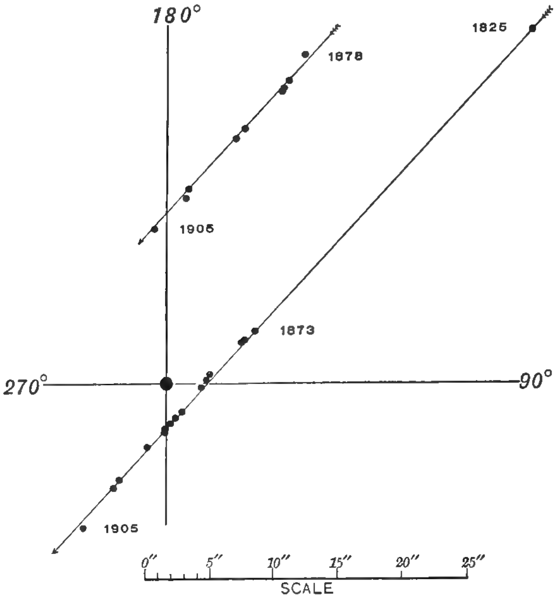
[Δ (II)...Ma (*F. S.* II)...β6...]

49 9 **3052.** **Σ 820.** Fixed.

1867.02	110°.6	4″.77	3*n*	Δ
1893.15	110.6	4.98	2*n*	Gla

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...T (2898)...Glasenapp (II)...]

49 10 **3053.** **S 503.** An interesting group from the proper motion of the principal star. After the record of it by S as a wide pair, it was entirely neglected by double star observers until its re-discovery by Dembowski, who noted it as new in 1873, the description at that time not corresponding at all with that given by South. In looking up the new pair, I found the two were identical, and that the change in position of both companions was due to the motion of A. The nearest faint star which could be seen at this time with the 18½-inch was measured. Subsequent measures show that this, like B and D, is not moving with A. Δ gives the magnitudes of A and B, 6.0 and 8.0. The three stars, A, B, and D, are respectively W¹ V, 1206, 1207, and 1202. The measures give A a proper motion of 0″.65 in 138°.5.



S 503

A and B

1825.07	134°.1	39″.94	2*n*	S
1873.93	120.1	8.08	3*n*	Δ
1875.21	118.6	7.07	3*n*	Δ
1875.88	117.5	6.72	3*n*	Δ
1881.18	99.3	3.58	3*n*	β
1882.16	92.4	3.28	3*n*	β
1883.11	82.6	2.90	3*n*	β
1887.04	30.4	2.83	4*n*	T
1888.19	16.8	2.94	2*n*	H
1889.11	8.6	3.36	3*n*	β
1890.15	0.8	3.68	4*n*	T
1890.17	0.3	3.92	4*n*	Hl
1892.92	345.4	5.36	4*n*	Jones
1898.09	335.6	8.52	2*n*	A
1899.12	334.8	9.24	2*n*	A
1905.04	330.4	13.00	2*n*	β

A and C

1878.00	157°.3	28″.09	1*n*	β
1881.19	158.3	25.54	2*n*	β
1882.14	158.5	24.96	2*n*	β
1883.10	158.8	24.61	4*n*	β
1889.11	163.2	20.92	3*n*	β
1890.13	164.3	19.90	3*n*	T
1899.12	173.6	15.29	2*n*	A
1899.95	174.4	14.53	3*n*	Doo
1905.04	184.1	12.07	2*n*	β

A and D

1825.07	337°.3	201″.76	2*n*	S
1875.21	335.7	230.04	3*n*	Δ
1875.88	335.7	230.84	3*n*	Δ
1881.19	335.3	233.18	2*n*	β
1882.16	335.3	233.46	3*n*	β
1883.11	334.3	234.09	3*n*	β
1887.04	334.2	236.11	4*n*	T

[Δ (1979, 2045) ... Δ (I) ... OΣ (X, p. 127) ... Gl (*Ast. Reg.* **XIX**, 174) ... Dreyer (*Mon. Not.* **XLVI**, 382) ... Gore (*Mon. Not.* **L**, 32) ... Sk^2 ... Flm ... T (2899, 2991, 3186) ... Hl (**II**) ... Com (**VI**) ... Jones (*A. J.* 312)(*Haverford Coll. Obsy.*, 1892) ... Maw (I) ... Ho (2978) ... β^1 ... β^3 ... β (2930) (*Pub. L. O.* **II**) ... A (3584, 3638) ... *A. G. Leipzig*, p. 207 ... Doolittle (*Pub. Flower Obsy.* I) ... β^6 ...]

49^{m} 18^{s} **3054. G. Anderson 2.** Discovered by Geo. Anderson with the Washington 26-inch. The place originally given is considerably in error. There is no motion.

1889.18	20°.5	9″.04	2*n*	Hl	
1901.32	20.2	9.14	2*n*	β	7.8...10.4

[Hl (I, II) ... β^5 ...]

49 21 **3055. Ho 227.** No other measures.

[Ho (2977) ...] (See p. 1066)

49 41 **3057. A. G. 102.** Double in *A. G. Lund*. Measures by β^6.

49 44 **3059. Perrine.** Discovered by Perrine at the Lick Observatory.

1902.25	307°.1	1″.92	1*n*	Lewis

[A (3584) ... Lewis (*Mon. Not.* **LXI**, 486) ...]

49 49 **3062. OΣ 121.** Dembowski thought it might be oblong in 10°, but very uncertain, 1866. Some change in the angle is probable.

The only other measures are:

1843.33	199°.0	0″.27	2*n*	Ma
1878.15	185.3	0.32	1*n*	β
1891.22	173.6	0.52	1*n*	HΣ
1898.94	172.4	0.47	3*n*	Hu

[OΣ (**IX**) ... Ma (**XI**) ... Δ (I, p. 227) ... β^1 ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ...]

50 14 **3063. Σ 812** *rej.* From *Catalogus Novus.* Identified and measured:

1905.08	65°.6	25″.43	1*n*	β^6	...11

50 43 **3064. β** *Aurigae.* **Ħ VI. 88.** (= σ 211.) The large star has a small proper motion:

Auwers	0″.060 in 263°.3
Newcomb	0.040 in 261.3

This is a spectroscopic binary, discovered by Miss Maury at the Harvard College Observatory (*Report Draper Mem.* 1890).

1879.45	38°.9	183″.88	2*n*	β
1904.83	39.3	184.41	2*n*	β

[β^3 ... Pk (*Mon. Not.* L, 296) ... β^6 ...]

50 44 **3065. Σ 821.** There may be a little change in the angle, but none in distance.

1866.67	8°.0	2″.00	3*n*	Δ
1895.25	4.7	2.02	2*n*	HΣ

[Ma (*F. S.* I) ...... Ma (**XII, XIII, XV**) ... Δ (**II**) ... Gl ... HΣ (**XII**) ...]

3066. See 57. The only later measures are: 50^{m} 48^{s}

1899.87	110°.3	23″.84	2*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

3069. β 1190. Discovered with the 36-inch. The distant star C is noted in the *Harvard Zones*, where it is called 17 m, and distance estimated 8″. 51 17

The later measures are:

A and B

1898.86	337°.7	1″.60	2*n*	A
1898.88	341.4	1.40	2*n*	β

A and C

1898.86	95°.8	6″.20	2*n*	A
1898.88	94.7	6.36	2*n*	β

[β (**XVII**) ... β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* I) ... A (3584) ...]

3070. β 1189. Discovered with the 36-inch. The magnitudes of A and C in DM are 9.0 and 9.2. DM (0°) 1230, 1229. 51 18

No other measures of the close pair.

1898.88	194°.5	58″.02	1*n*	β

[β (**XVII**) ... β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* I) ...]

3071. H 34. No particulars in H. The place is substantially the same as that of the 9.1 m star, DM (7°) 1071. 51 22:

3073. β 1055. *Aurigae* **161. B. A. C. 1899.** (AC = **Ħ VI. 91** = σ 212.) The close companion was discovered with the 36-inch. The proper motion is given by Kustner as 0″.057 in the direction of 238°.6. It is certain that A and B are moving together. 51 32

The following are all the other measures:

A and B

1899.80	333°.6	2″.15	4*n*	Barnard
1903.13	336.2	1.52	4*n*	Doo

A and C

1783.49	315°.1	30″.05	1*n*	Ħ
1899.77	327.8	33.38	3*n*	Barnard

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... Doolittle (*A. J.* 547) ...]

3074. θ *Aurigae.* **OΣ 545.** (AC = **Ħ V. 89** : AD = **Ħ VI. 34** : ACD = **Sh 68** = σ 213.) The close star is moving in space with the other, but the measures are very discordant in angle and distance, and show only slow retrograde motion. The proper motion of θ is given from meridian observations: 51 32

Auwers	0″.090 in 153°.1
Newcomb	0.107 in 148.0

The change in the distant stars is explained by this movement of A. There is another small star about the same distance as D in the direction of AC.

A and B

1876.45	1°9	2″17	4*n*	Δ
1877.75	1.1	2.44	2*n*	OΣ
1878.59	5.4	2.08	3*n*	β
1883.31	358.5	2.36	7*n*	En
1885.12	[illegible].6	1.98	3*n*	T
1888.25	355.4	1.76	2*n*	T
1891.29	345.5	2.16	2*n*	HΣ
1893.15	343.9	2.45	5*n*	Ho
1899.52	345.7	2.45	2*n*	A
1899.56	346.7	2.50	3*n*	Hu

A and C

1852.12	290°9	43″19	1*n*	OΣ	...11.0
1870.25	292.2	45.03	1*n*	OΣ	
1876.24	292.6	45.17	2*n*	Δ	...10.5
1879.41	293.3	45.51	3*n*	β	
1892.17	293.1	46.35	2*n*	Ho	
1899.56	294.0	47.27	3*n*	Hu	

A and D

1840.16	350°7	123″33	1*n*	OΣ	...9.5
1852.12	350.3	124.85	1*n*	OΣ	
1880.05	349.6	127.10	1*n*	β	
1890.70	349.6	127.41	5*n*	Renz	

[OΣ (**IX**) (**X**, pp. 14, 200)... Δ (**I**)... Flm... Sadler (*Mon. Not.* **XXXIX**, 186)... En (2678)... T (2866, 2991)... Ho (3234)... Renz (*Bul. St. P. Acad.* 1892)... β^{1}... β^{2}... β^{3}... Maw (**III**)... A (3638)... Hu (*Pub. L. O.* **V**)... HΣ (**XII**)...]

51m 35s **3075.** **Σ 822** *rej.* From *Catalogus Novus.* Examined and estimated, 60° : 12″ : 8...10 (1876).

1904.99	51°4	15″44	1*n*	β^{6}	8.0...10.5

51 38 **3076.** **H 5466.** "Seen double, but not verified by magnifying." Examined once or twice with the 6-inch, and later with the 18½-inch, but nothing found worth noting. With the 40-inch a 14 m star was seen near the 9.2 m star, DM (−1°) 1075, 110°7 : 16″1 (1901.79) β^{5}.

51 57 **3077.** **Σ 823.** (= **H 375.**) Herschel called both stars *red.* Unchanged.

1867.00	339°0	7″52	3*n*	Δ
1893.18	338.4	7.01	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Δ (**II**)... T (2991)... Glasenapp (**II**)...]

52 8 **3078.** **OΣ 124.** **B. A. C. 1907.** This close pair requires careful examination, as the duplicity is somewhat uncertain. The following are all the measures:

1843.21	324°2	0″30	2*n*	Ma
1845.22	308.7	0.53	1*n*	OΣ
1846.22	311.0	0.36	1*n*	OΣ
1866.15	324	obl.	1*n*	Δ
1873.25	242.2	0.66	1*n*	OΣ
1894–96	Single		4*n*	Com
1894.18	Single		2*n*	HΣ
1898.19	Single, 26-in.			Brown
1899.72	Single, 36-in.			Hu

[Ma (**XI**)... OΣ (**IX**)... Δ (**I**, p. 228)... Flm... En (2678)... Com (*Pub. Washburn Obsy.* **X**)... Brown (3645)... Hu (*Pub. L. O.* **V**)... HΣ (**XII**)...]

3079. 59 *Orionis.* **H V. 100.** (= σ 214.) The proper motion of the large star is 0″015 in 136°3 (Auwers). The only modern measures are: 52m 10s

1878.18	205°8	36″57	1*n*	β^{1}	
1901.32	204.3	36.74	2*n*	β^{5}	...9.7

3081. **OΣ 126.** Unchanged. 52 24

1867.51	59°8	10″30	3*n*	Δ
1898.17	60.4	10.59	3*n*	Hu

[Ma (**XI**)... OΣ (**IX**)... Ba (**I**)... Hu (*Pub. L. O.* **V**)...]

3082. **A 322.** The large star, L 11327, has a proper motion of 0″24 in 173°9 (Porter). 52 25

[A (*Bul. L. O.* No. 29)...]

3083. **OΣ 125.** Relatively fixed. The measure by Ma, 253°6 : 0″3 (1844.22) 1*n*, evidently belongs to some other pair. 52 28

1869.00	360°4	1″36	4*n*	Δ
1898.06	358.8	1.39	3*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)... Δ (**I**).. T (2899)... En (2678)... Maw (**III**)... Hu (*Pub. L. O.* **V**)... Sk^{6}, p. 107...]

3085. **Σ 826.** A slow increase in the angle and distance. 52 49

1867.43	122°2	2″22	3*n*	Δ
1877.10	124.2	2.09	4*n*	Cin
1877.72	125.7	2.18	2*n*	β
1899.11	123.2	2.05	2*n*	Lewis

[Ma (*F. S.* **I**, 23, 108)... Ma (**XIII, XV**)... Δ (2194)... Δ (**II**)... Flm... WS... WS^{2}... Sk... Pt... LM... β^{1}... Sk^{4}... Do (3378, 3799)... Lewis (*Mon. Not.* **LX**, 498)...]

3087. **Hu 826.** (AC = **Ho 511.**) The principal star of Ho 511 was found to be a close pair by Hussey. The later measures are: 53 10

A and B

1904.01	300°0	0″58	1*n*	β

A and C

1903.88	170°3	4″10	3*n*	β

[Ho (3557)... β^{6}...]

(See p. 1066)

3088. **S 504.** (= σ 215 = **Hd 80.**) In 1856 Jacob thought the angle had decreased, but as there is no change since that time, it is probable that South's angle was too large. He speaks of the pair as "excessively difficult." In Lalande 8½ m; observers rate the stars from 8 to 9. 53 19

1876.20	70°6	3″72	5*n*	Cin

[J^{3}... Cin^{3}... Cin^{4}... Wilson (Cin^{10})...]

3089. **Ho 21.** The large star has a proper motion of 0″021 in 286°7 (Battermann). The only measure is: 53 28

1891.15	241°7	9″19	1*n*	Ho

[Ho (2778, 3558)...]

(See p. 1066)

$53^{m}\ 30^{s}$ **3090.** **Σ 825.** Fixed. Wr speaks of a 13 m star in the *sf* quadrant, which H estimated 40″ distant.

1867.11	146°3	8″07	3*n*	Δ

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII**)...H (**VI**)...Wr...Δ (**II**)...]

53 41 **3091.** **A 119.** Discovered by Aitken (3741)(*Bul. L. O.* No. 3). No other measures.

53 48 **3092.** **OΣ 127.** Apparently unchanged.

1868.14	330°0	1″55	4*n*	Δ
1898.34	333.8	1.51	4*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

53 48 **3093.** **H̥ IV. 48.** The only measures since 1783 are:

AB	1904.40	259°2	31″24	2*n*	β^{6}	8.6...11.9
BC	1904.40	209.8	5.81	2*n*	β^{6}	...12.0

The apparent change in AB may not be real.

53 55 **3094.** **A. G. 103.** Double in *A. G. Berlin.* Measures by Cogshall (*A. J.* 546).

54 0 **3096.** **Σ 829.** Some change in the distance of B.

A and B

1868.76	235°6	17″20	3*n*	Δ
1897.71	234.6	17.90	5*n*	Doo
1900.77	235.6	17.81	2*n*	β

B and C

1897.71	219°5	5″62	5*n*	Doo
1900.77	220.4	5.44	2*n*	β

[Ma (*F. S.* **II**)...Δ (1736)...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^{5}...]

54 58 **3099.** 35 *Camelopardali.* **Hu 559.** (AB = **H 2292** = **OΣ 128** *rej.*) The duplicity of the Herschel companion was discovered by Hussey with the 36-inch at the Lick Observatory. There are no other measures. There is no apparent change in the position of this with reference to the large star. The proper motion is small, 0″043 in 191°3 (Battermann).

A and BC

1843.29	12°5	39″98	1*n*	Ma
1898.44	13.3	39.53	3*n*	Hu

[Ma (**XI**)...Ra (**XXII**)...Δ (**I**)...Hu (*Bul. L. O.* No. 27)(*Pub. L. O.* **V**)...]

54 59 **3100.** **β 564.** Discovered with the 18½-inch.

1899.02	73°0	1″47	1*n*	β

[β (**X**)...β^{1}...β (3141)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

(See p. 1066)

55 26 **3102.** **A 120.** Discovered at the Lick Observatory by Aitken (*Bul. L. O.* No. 3)(*A. N.* 3741). No other measures.

3104. **A. G. 104.** Double in *A. G. Lund.* Measures by β^{6}. $55^{m}\ 31^{s}$

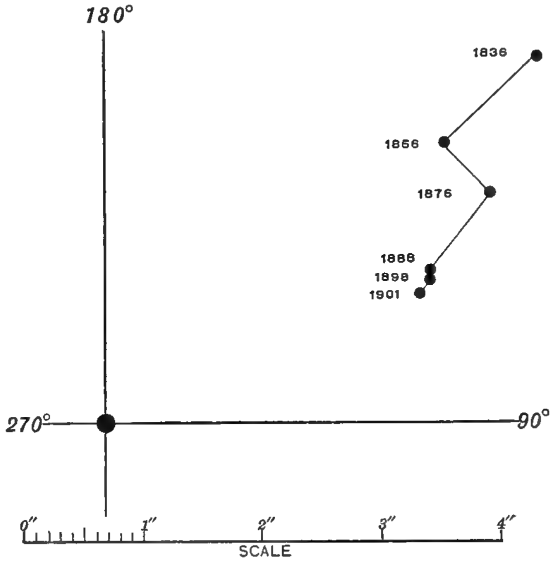
3108. **Σ 832** *rej.* From H (VIII). No later observations. 55 38

3111. *μ Orionis.* **β 1056.** Discovered with the 36-inch. The large star has a proper motion of 0″020 in the direction of 4°2 (Auwers). It is probably only an optical pair. 55 47

1890.86	272°7	17″11	3*n*	β
1898.08	273.8	17.25	1*n*	A

[β (**XV**)...β (2929, 3048) (*Pub. L. O.* **II**)...A (3584)...]

3112. **H 3823.** "Both stars *orange*, or even *red*." Both stars in Cordoba G. C. as Nos. 7127 and 7129. The change is probably due to proper motion, but the distance measures are too uncertain to give any definite value to the movement 55 51



H 3823

1836.95	130°5	4″84	1*n*	H
1856.11	129.8	3.75	1*n*	Se
1876.96	121.0	3.82	2*n*	Cin
1888.14	115.3	3.04	2*n*	Lv
1898.07	113.6	3.01	3*n*	Doo
1901.26	112.2	2.88	2*n*	Tebbutt

[H^{3}...WJ...Maclear (*Mon. Not.* **XI**, 39)...Se^{1}..Se^{3}...Pt...Cin^{3}...Cin^{4}...Lv^{1}...Lv (*Sid. Mess.* **VII**, 172)...Flm...Sellors (3303)...Do (3378, 3798)...Doolittle (*Pub. Flower Obsy.* **I**)...Tebbutt (*Mon. Not.* **LXI**, 501; **LXII**, 485)...]

3113. **Σ 830.** (= **H 376.**) No change in C, but later measures make the angle of AB larger, and the distance less. 55 54

1868.03	252°9	12″38	4*n*	Δ
1869.38	253.4	12.59	4*n*	Du
1893.13	255.3	12.19	2*n*	Gla

[Ma (*F. S.* **I**)...H (**VII**)...Δ (**II**)...Flm...WS^{2}...Du...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

56^m 12^s **3116.** 3 *Monocerotis.* **β 16.** Discovered with the 6-inch. This star is involved in a large, faint nebula (Dreyer 2142). The proper motion, according to Auwers, is 0″036 in the direction of 313°3. Taking this value, and the position of the companion in 1875 from the measures of Δ, the small star, if fixed in space, should be 23°9 : 1″14 (1898.8). It is evident from the measures that no such relative change has occurred, and that the components, having the same proper motion, probably form a physical system.

1875.59	354°8	1″62	2*n*	Δ	6.0... 9.7
1877.97	352.2	2.12	1*n*	Cin	5.5... 8.5
1878.17	354.0	1.66	2*n*	Cin	5.3... 8.3
1888.99	354.0	1.69	2*n*	T	6.0... 9.5
1889.02	353.9	1.88	4*n*	Lv	5.2... 9.2
1898.83	351.5	1.82	1*n*	Cg	6.0...10.0
1898.88	356.1	1.68	1*n*	β	6.0...10.0

[β (I)...β (*Mon. Not.* **XXXIII**, 351) (*Pub. Y. O.* I)...Knott (*Mem. R. A. S.* **XLIII**) ...Δ (I)...Cin^4...Cin^5...T (2991)...Lv^1...Cogshall (*A. J.* 478)...]

56 14 **3117.** **A 214.** Discovered at the Lick Observatory. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

56 29 **3118.** **Σ 836.** Probably unchanged, but no late measures.

1867.79	31°7	2″00	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XIII**)...Hd...Δ (**II**)...]

56 49 **3121.** **β 893.** **B. A. C. 1935.** Discovered with the 18½-inch. This is a naked-eye star near 40 *Aurigae.*

1892.07	130°5	17″95	2*n*	β
1898.79	127.4	17.75	1*n*	β

[β (**XIII**)...β^3...β (3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

56 52 **3123.** **Σ 834.** (= **H 377.**) Unchanged.

1866.90	308°5	22″83	3*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

57 17 **3125.** **Σ 837** *rej.* This is identical with Σ 833 *rej.*, which has an error of 1 m R. A.

1905.05	225°6	19″55	1*n*	β^6	8.3...10.0

57 44 **3127.** **Σ 824.** *Camelopardali* **102.** Probably without motion.

1869.46	214°0	1″55	4*n*	Δ

[Ma (*F. S.* I)...Δ (**II**)...]

57 46 **3128.** **See 58.** The only later measures are:

1899.80	213°4	1″64	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

3129. **Σ 835.** Fixed. 57^m 57^s

1867.13	145°2	2″16	3*n*	Δ
1893.07	147.5	2.09	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Bp...Da^3...Ba (**II**)...Pl...T (2898)... Δ (**II**)...Glasenapp (**II**)...]

3130. **Σ 831.** No material change. 58 18

1867.50	76°2	11″45	3*n*	Δ

[Ma (*F. S.* **I**)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...]

3131. **A 215.** No other measures. 58 24

[A (3784) (*Bul. L. O.* No. 16)...]

3132. **See 59.** Discovered at the Lowell Observatory (*A. J.* 431). 58 25

3133. **OΣ 129.** *Aurigae* **183.** (= **β 1057** *rej.*) Inadvertently given as new in my *Fifteenth Catalogue.* This star is Lalande 11501. Relatively fixed. 58 43

1867.95	208°0	10″00	3*n*	Δ
1889.10	209.5	9.98	3*n*	β
1898.79	207.8	10.08	3*n*	Hu

[Δ (I)...OΣ (**IX**)...β (2929) (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...]

3135. **Skinner 2.** Noted by him with the Washington meridian circle. Measures by Boeger (*A. J.* 522). 58 43

3136. **Σ 839.** Unchanged. 58 25

1867.70	288°1	4″89	3*n*	Δ
1905.05	288.8	4.65	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^6...β^6...]

3137. **Σ 838.** Very little if any change. The principal star has a proper motion of 0″062 in 166°0 (Bossert). 58 57

1868.42	326°4	39″63	4*n*	Δ
1905.05	327.2	40.11	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XII**)...H (**V**)...Δ (**II**)...β^6...]

3139. **OΣ 130.** No sensible change. Dembowski could not measure it in 1865. 59 14

1843.28	187°7	0″35	3*n*	Ma
1878.84	190.4	0.36	1*n*	β
1883.60	188.7	0.33	7*n*	En
1895.25	186.3	0.52±	2*n*	HΣ
1899.19	200.2	0.40	3*n*	Hu

[OΣ (**IX**)...Δ (**I**, p. 228)...Ma (**XI**)...β^3...En (2678)...Hu (*Pub. L. O.* **V**)... HΣ (**XII**)...]

59ᵐ 19ˢ **3142.** **OΣ 131.** No change.

1868.31	281°.8	1″.59	4*n*	*Δ*
1898.29	279.9	1.50	3*n*	Hu

[**Ma (XI)**...**OΣ (IX)**...*Δ* **(I)**...**En** (2678)...**Hu** (*Pub. L. O.* **V**)...**HΣ (XII)**...]

59 33: **3143.** **Glasenapp 2.** From Glasenapp (II).
(See p. 1066)

59 35 **3144.** **A. G. 105.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546).

59 38 **3145.** **H 2291.** "A very pretty double star." In DM 9.1 m.

59 49 **3146.** **Σ 840.** No change in AB, and very little, if any, in the close pair.

B and C

1847.72	179°.4	0″.92	2*n*	OΣ
1857.12	181.5	0.55	2*n*	Se
1866.73	172.6	0.97	3*n*	*Δ*
1879.01	174.8	0.74	2*n*	*β*
1894.18	170.2	0.40±	2*n*	HΣ
1898.11	171.1	0.80	1*n*	Brown
1903.56	171.1	0.69	2*n*	A

A and BC

1866.69	247°.4	21″.28	3*n*	*Δ*
1903.56	247.5	20.93	2*n*	A

[**Ma** (*F. S.* **I**)... **Ma (X, XI)** ... **H**¹... **H**²... **H (VII)**... **Se**... **Se** (*Comp. Rend.* **XLVIII**, 375)... **Flm**... **OΣ (IX)**... *Δ* (2194)... *Δ* **(II)**... **En** (1673)... **Hd**... *β*³... **Brown** (3645)... *A. G. Leipzig*, **p.** 207...*Annals Toulouse Obsy.* **III**... **HΣ (XII)**...**Sk**⁵...]

59 58 **3148.** **OΣ 132.** Perhaps a slow advance in the angle.

1869.94	319°.7	1″.65	5*n*	*Δ*
1895.29	320.3	1.66	2*n*	HΣ
1898.29	324.0	1.66	3*n*	Hu

[**Ma (XI)**...**OΣ (IX)**...*Δ* **(I)**...**Flm**... **Do** (2322)... **Sk**³... **Brown** (3645)...**HΣ (XII)**...**Hu** (*Pub. L. O.* **V**)...]

0 ± **3150.** **H V. 14.** "Multiple. Unidentifiable."

0 ± **3151.** **Hd 81.** Not identified later at the Harvard College Observatory.

0 23 **3154.** **Arg. 12.** Double in O. Arg. S.

1896.02	293°.2	5″.22	3*n*	Scott

[**Cin**³...**Cin**⁵...**Scott** (*Brit. Ast. Ass'n* **VI**, 368)...]

0 27 **3156.** **Σ 843** ***rej.*** From *Catalogus Novus.* H (VIII) 126°±: 10...11 (1834). Since Part I was in type I have identified this as SD (14°) 1328, the place of which is:

R. A. = 5ʰ 49ᵐ 42ˢ }
Decl. = −14° 18′ }

The only measures are:

1904.84	15°.7	24″.29	1*n*	*β*⁶	8.3...11.0

3157. **H 3830.** "Elegant double star" Probably fixed. 0ᵐ 43ˢ

1854.0	2°.0	6″.45		WJ
1879.05	1.4	6±	6*n*	Cin
1882.10	1.5	6.42	2*n*	Wilson
1897.06	2.5	7.13	1*n*	Scott

[**WJ**²...**Cin**⁵...**Wilson (Cin**¹⁰)...**Scott** (*Brit. Ast. Ass'n* **VIII**, 66)...]

3158. **Σ 842** *rej.* "Not found. Many stars 10–11 m; none 8 m, and none double," H (VI). 0 44:

Since Part I was in type, I have identified and measured this. It is the 9.5 m star, DM (36°) 1366, the place of which is substantially the same as that given. The 40-inch shows a 13 m companion nearer, 94°: 18″.7.

1905.07	18°.2	30″.23	2*n*	*β*⁶	8.6...10.7

3159. **OΣ 133.** No change. 0 51

1869.67	34°.6	2″.95	4*n*	*Δ*
1898.70	34.0	3.16	4*n*	Hu
1903.10	35.6	2.90	2*n*	Do

[**OΣ (IX)**...*Δ* **(I)**...**Ma (XI)**...**Sk**³...**Hu** (*Pub. L. O.* **V**)...**Do** (3930)...]

3161. **H 5468.** "Place very precarious." This was looked for in measuring H 379 (No. 3166). The only pair found was DM (31°) 1203, which has a small companion, 73°.7 : 17″.0. The place is: 1 ±

R. A. = 6ʰ 0ᵐ 38ˢ }
Decl. = 31° 13′ }

3162. **Σ 847.** (= **H 2294.**) Fixed. 1 0

1867.99	262°.9	24″.72	3*n*	*Δ*
1878.89	261.6	24.83	2*n*	*β*
1904.79	262.5	24.82	2*n*	*β*

[**Ma** (*F. S.* **I**)...*Δ* **(II)**...*β*³...*β*⁶...]

3164. **Σ 846.** No motion. 1 10

1867.75	138°.1	12″.86	3*n*	*Δ*
1904.79	136.8	13.01	2*n*	*β*

[**Ma** (*F. S.* **I**)...**Ma (XI)**...*Δ* **(II)**...*β*⁶...]

3165. **Arg. 13.** **Groombridge 1084.** "Duplex Cl. III," in O. Arg. N. The larger star has a proper motion of 0″.095 in 202°.6 (*Gr. 10-year Cat.*). The only measures are: 1 16

1881.29	250°.2	25″.24	1*n*	OΣ	7-8...8-9
1903.09	253.1	24.19	3*n*	*β*	

[**OΣ (X, p.** 127)...*β*⁶...]

3166. **H 379.** "Very pretty double star." Well seen with the 6-inch. 1 20

1877.23	121°.3	9″.15	1*n*	OΣ	7-8...11
1903.04	116.7	9.09	3*n*	*β*	7.8...11.3

[**OΣ (X, p.** 127)...**HΣ (XII)**...*β*⁶...]

$1^m\ 24^s$ **3167.** **Σ 850.** Without change.

1867.49	16°.7	2″.22	2*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...Δ (**II**)...Gl...WS^2...]

1 26 **3168.** **H 380.** The only later observation is:

1831 +	210° ±	18″ ±	1*n*	H (VII)

(See p. 1066)

1 30 **3169.** **Σ 844.** Fixed.

1866.75	6°.6	23″.61	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Hd...Δ (**II**)...Gl...WS^2...]
(See p. 1066)

1 32 **3170.** **H 3833.** **B. A. C. 1965.** The only later observation is·

1905.12	71°.8	43″.77	1*n*	β^6	...10.7

1 42 **3171.** **Σ 848.** (AB = **Ħ I. 57** = **S 506** : ADE = **S 507**.) There is no change in the relations of the three principal stars. The faint companion C is not in Σ.

A and B

1867.72	107°.9	2″.49	3*n*	Δ	
1893.07	109.4	2.25	2*n*	Gla	

A and C

1878.00	295°.4	15″.55	1*n*	β	
1898.12	294.7	15.99	3*n*	Doo	...9.7

A and D

1867.72	120°.6	28″.40	3*n*	Δ
1893.07	120.4	28.32	2*n*	Gla

A and E

1867.72	183°.1	43″.35	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Da^1...Ra (**XXIII, XXIV**)...Hd...Se...Du...WS^2...Δ (1204)...Δ (**I, II**)...β^1...T (2898)...Glasenapp (**II, III**)...Knorre (3518, 3632)...*A. G. Leipzig*, p. 207...Doolittle (*Pub. Flower Obsy.* **I**)...]

1 45 **3172.** **Σ 849.** No change, but the stars have a common proper motion of 0″.031 in 199°.1 (*A. G. Berlin*).

1868.79	242°.3	0″.90	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Δ (**II**)...]

1 45 **3173.** **A 121.** Not in DM. It is 164″ distant in 247° from the 8 m star, *A. G. Camb.* 2695. No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

1 46 **3174.** **Σ 851.** No change. The angle of 160°.7 (1844.2) in Ma (XI) belongs to some other pair.

1867.69	28°.3	2″.86	3*n*	Δ
1904.79	31.4	2.79	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

3175. **H 3835.** A small error in H's place. In the field with H 3833, and angle and distance similar to that. There is a 13 m star *nf* A which is nearer than the Herschel companion. $1^m\ 51^s$

1905.12	82°.7	30″.25	1*n*	β^6	8...11

3176. **OΣ 134.** Fixed. This star is not in L and W^2. The magnitudes in DM are, 8.2...9.4. The large star is given a proper motion of 0″.087 in 69°.9 (*A. G. Berlin*). 1 54

1867.56	187°.9	31″.00	3*n*	Δ	6.8...8.1
1898.36	188.5	31.15	3*n*	Hu	7.0...8.3

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

3178. **A 54.** Later measures are: 2 5

1903.19	351°.7	0″.46	1*n*	Bowyer

[A (3668) (*Pub. A. S. P.* **XII**, 127)....Lewis and Bowyer (*Mon. Not.* **LXII**, 383; **LXIV**, 793)...]

3179. **Σ 852.** There is no change in the position of the companion. Dembowski measures a third star 9.3 m, 28°.2 : 43″.95 (1870.48) 2*n*. The identity of Σ 852 in DM has been uncertain heretofore. 2 7

1869.50	318°.4	9″.02	4*n*	Δ
1879.02	317.9	9.00	2*n*	β
1903.17	319.6	9.05	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...β^6...]

3180. **Σ 854.** Without change. 2 7

1867.67	320°.5	5″.81	3*n*	Δ
1894.14	321.1	5.83	1*n*	Leip

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...Δ (**II**)...Hd...Gl...WS^2...*A. G. Leipzig*, p. 247...]

3181. 41 *Aurigae.* **Σ 845.** (= **Ħ III. 82** = **Sh 366**.) Relatively fixed, but common proper motion of 0″.063 in 183°.6 (Auwers). 2 25

1866.23	353°.9	7″.92	3*n*	Δ
1890.18	354.2	7.93	3*n*	Hl
1897.29	355.2	7.63	3*n*	Coleman

[Ma (*F. S.* **I**, 23, 109)...Ma (**IX, X, XIII, XV**)...Ek (**I**)...Bes...H^2...Da^2...Ma (304)...K...K (409)...Se...Se^3...Wr (*Phil. Trans.* 1851)...Auwers (1393)...Ba (**II**)...Wr...Lu (**I, II, III**)...Ra (**XXII**)...Δ (1110, 1256)...Δ (**I, II**)...Gl...Du...WS^2...Wh...Franz (2590)...Bl (**V**)...Hl (**I, II**)...Cohn (3240)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 528)...Coleman (*Mem. R. A. S.* **LIV**)...]

3182. 3 *Geminorum.* **β 1241.** Discovered with the 36-inch. It is a difficult pair of the 85 *Pegasi* class. The proper motion is very small, 0″.0024 in the direction of 145°.4 (Auwers). The following are all the later measures: 2 27

A and B

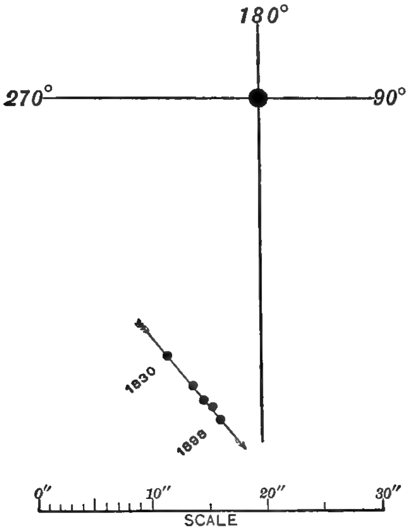
1894.53	331°.2	0″.48 ±	3*n*	Sp
1899.92	334.0	0.50	2*n*	A
1900.24	345.8	0.45	1*n*	Lewis
1900.24	329.2	0.41	1*n*	Bryant

A and C

1899.05	60°.5	18″.60	1*n*	β
1900.21	63.1	17.85	1*n*	Lewis

[β (**XVIII**) . . . β (3113) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . Sp (**III**) . . . A (3638) . . . Lewis and Bryant (*Mon. Not.* **LXI**, 486; **LXIV**, 793) . . .]

$2^m 28^s$ **3183.** Σ 853. Change from proper motion. The measure in Ma (XIII) belongs to some other pair.



Σ 853

1830.52	340°.1	24″.06	3*n*	Σ
1864.51	346.9	26.15	6*n*	Δ
1879.02	349.2	27.07	2*n*	β
1885.21	351.0	27.62	3*n*	Hl
1894.46	352.4	28.19	3*n*	HΣ
1898.12	352.6	28.47	3*n*	Doo

[Ma (*F. S.* **II**) . . . Ma (**XIII, XV**) . . . En . . . Flm . . . Δ (1473) . . . Δ (**II**) . . . Pl . . . Hl (*Wash. Obsns.* 1885) . . . Hl (**I, II**) . . . β³ . . . Sk³ . . . Sk⁴ . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . *A. G. Leipzig*, p. 207 . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . . Furner and Storey (*Mon. Not.* **LXIV**, 445) . . .]

2 34 **3184.** Σ 856. Fixed.

1867.64	49°.8	9″.91	3*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XI, XV**) . . . H¹ . . . Gl . . . WS² . . . Δ (**II**) . . .]

2 42 **3185.** Σ 855. (= **S** 508.) Relatively fixed.

1866.66	113°.8	29″.36	3*n*	Δ
1889.99	113.4	28.92	4*n*	Giacomelli

[Ma (*F. S.* **I**) . . . . H¹ . . . . H (**V**) called Σ 858 . . . . Ra (**XXXI**) . . . . En . . . . Δ (1204) . . . . Δ (**I, II**) . . . . Giacomelli (**I**) . . . . Glasenapp (**II, III**) . . . . *Annals Toulouse Obsy.* **III** . . .]

2 48 **3186.** 4 *Monocerotis.* **β** 17. The nearest companion was discovered with the 6-inch, and in measuring that Knott detected the third star C. Auwers gives the proper motion of the principal star 0″.029 in the direction of 84°.2. With this value, and the relation of AB from the measures of Δ in 1875, the smaller component, if fixed, should be, for 1898.17, 189°.4 : 3″.27. The measures show no such change in the angle, and point to a common proper motion, so far as A and B are concerned. The observations are not sufficient to decide as to C.

A and B

1875.90	178°.0	3″.16	3*n*	Δ
1888.98	178.1	3.37	2*n*	T
1892.02	180.4	3.21	3*n*	β
1898.17	181.4	3.01	2*n*	A

A and C

1892.02	246°.8	8″.77	3*n*	β
1898.17	249.1	9.32	2*n*	A

[β (**I**) . . . β (*Mon. Not.* **XXXIII**, 351) . . . β (3114) (*Pub. L. O.* **II**) . . . Knott (*Mem. R. A. S.* **XLIII**) . . . Cin⁵ . . . T (2991) . . . A (3584) . . .]

3187. Measured by β⁶ in looking for No. 3189. A fainter star, 239° : 16″.4. $2^m 53^s$

3189. A. G. 106. Double in *A. G. Leiden.* Measures by β⁶. 3 5

3190. Σ 859. Distance increasing from proper motion. The annual apparent movement of the companion is 0″.07 in 230°. 3 11

1829.70	249°.0	31″.42	2*n*	Σ
1845.19	248.4	32.05	1*n*	Ma
1866.32	247.5	33.90	3*n*	Δ
1879.03	246.7	34.40	2*n*	β
1898.15	246.2	36.50	5*n*	Doo
1904.77	246.8	36.76	2*n*	β

[Ma (*F. S.* **I**) . . . En . . . Δ (1735) . . . Δ (**II**) . . . Flm . . . Pt . . . β³ . . . Sk³ . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . *Annals Toulouse Obsy.* **III** . . . β⁶ . . .]

3191. 4 *Geminorum.* **β** 1058. Discovered with the 36-inch. The proper motion of 4 *Geminorum* is 0″.014 in the direction of 270° (Auwers). It is certain that this pair will prove to be a binary system. The following are all the measures: 3 13

1889.13	284°.3	0″.41	2*n*	β
1890.88	284.0	0.25 ±	8*n*	Sp
1891.01	281.3	0.28	3*n*	β
1891.84	283.1	0.30	3*n*	β
1899.92	275.8	0.28	2*n*	A
1899.95	273.7	0.32	6*n*	Gr. Obsy.
1901.96	272.5	0.30	5*n*	Gr. Obsy.
1901.97	260 2	0.34	1*n*	Doo

[β (**XV**) . . . β (2929, 3048, 3114) (*Pub. L. O.* **II**) . . . Sp (**III**) . . . A (3638) . . . Doolittle (*A. J.* 547) . . . . Greenwich Obsy. (*Mon. Not.* **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIV**, 793) . . .]

3192. H VI. 114. Identified and measured. No other observations since 1783. 3 21

1903.00	108°.1	54″.66	2*n*	β⁶	7.7 . . . 9.2

3^m 24^s **3193.** **OΣ (App) 69.** B = Rad^1 1653. Unchanged.

1882.90	126°1	70″27	4*n*	Franz

[Δ (I)...Franz (2649)...]

3 36 **3194.** **Σ 861.** There is no appreciable change in the close pair. The distance of A from BC is decreasing from proper motion. If this movement belongs to BC, the components are moving together.

B and C

1868.45	319°0	1″52	3*n*	Δ
1880.95	318.2	1.53	4*n*	Sp
1901.25	318.2	1.61	2*n*	β

A and BC

1844.22	15°4	66″97	2*n*	OΣ
1867.79	16.1	66.22	3*n*	Δ
1881.26	16.4	65.86	1*n*	OΣ
1893.14	16.4	65.93	2*n*	Gla
1901.41	17.0	65.47	3*n*	β
1903.24	17.6	65.22	2*n*	Biesbroeck

[Ma (*F. S.* I)...Ma (**XI, XIII**)...H (**VII**)...OΣ (**IX**)(**X**, pp. 15, 157)...Δ (**I, II**)...Δ (2194)...Se...Flm...Gl...Sk^3...Sp (**II**)...Glasenapp (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Sk^5...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck ...β^5...]

3 41 **3196.** **β 565.** Discovered with the 18½-inch. In L and W^1 7½ m; DM 8.2. The only later measures are:

1892.07	99°9	1″13	3*n*	β	8.1...9.1

[β (**X**)....β^1....β (3141) (*Pub. L. O.* **II**)...]

3 42 **3197.** **β 1242.** (AC = **H 2298.**) The close pair was discovered with the 36-inch while examining the nebula No. 2182 of *Dreyer's Catalogue*. The wide pair, H 2298, is found in *Herschel's Fifth Catalogue of Double Stars*, in which he says: "The larger star has a strong nebulous burr. It is my father's IV. 38." In the 36-inch this is a large faint nebula, with the double centrally placed in it. All the other measures are given:

A and B

1901.85	120°1	0″42	3*n*	Doo

AB and C (= H 2298)

1891.87	92°9	43″87	3*n*	β	...10.7

[β (**XVIII**)....β (*Mon. Not.* **LII**, 455)....β (3113) (*Pub. L. O.* **II**, pp. 178, 225).... Doolittle (*A. J.* 547)...]

3 42 **3198.** **Σ 860.** Fixed.

1868.66	357°0	5″73	4*n*	Δ
1905.05	357.9	5.70	1*n*	β

[Ma (*F. S.* I)...Ma (**XI, XII, XIII**)...H^1...WS...WS^2...Gl...Δ (**II**)...β^6...]

3 55 **3200.** **Hu 701.** The mean given here includes the single measure in Part I:

1904.29	95°8	0″23	4*n*	Hu	8.5...10.0

[Hu (*Bul. L. O.* No. 65)...]

3201. **A 55.** A 14 m star 11°9 : 18″84. 4^m 4^s

1903.19	288°1	0″58	1*n*	Bowyer

[A (3668) (*Pub. A. S. P.* **XII**, 127)...Bowyer (*Mon. Not.* **LXIV**, 793)...]

3203. **Σ 862.** Fixed. 4 26

1868.88	336°0	6″42	4*n*	Δ
1878.91	335.4	6.26	1*n*	β
1904.84	336.2	6.53	2*n*	β

[Ma (*F. S.* I)...Ma (**XIII**)...Δ (**II**)...β^3...β^6...]

3204. **Σ 867.** No change since Struve. 4 40

1866.09	152°6	2″09	3*n*	Δ
1881.14	154.6	2.11	1*n*	β
1895.17	154.5	2.18	2*n*	HΣ

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...Δ (**II**)...Gl...β^3...HΣ (**XII**)...]

3205. **Σ 865.** Probably without change. The principal star has a proper motion of 0″041 in 6°5 (*A. G. Harvard*). 4 54

1866.58	68°0	5″17	3*n*	Δ
1901.04	66.9	5.28	1*n*	Es

[Ma (*F. S.* I)...H (**V**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...Espin (*Mon. Not.* **LXIV**, 676)...]

3206. 68 *Orionis.* **H VI. 72.** The proper motion of this star is given 0″020 in 95°8 (Auwers). The companion is DM (19°) 1252. The only measures since 1783 are: 4 55

1900.76	213°8	85″54	2*n*	β^5	...8.6

3207. **Jacob 2.** From J^2, who states that he looked for it several times later without seeing it double. I have looked for it repeatedly, and am certain that there is nothing of the kind here. I have no doubt there is an error of about 20^m R. A. in the place of J, and that it is identical with β 94 (No. 3008). The descriptions agree. 5 ±

3208. **H 2299.** "Triple; in the *p* part of a cluster." The principal star is SD (3°) 1323 (9.5) The only measures are: 5 0

AB	1903.74	41°2	17″77	2*n*	β^6	10.0...11.5
AC	1903.74	298.8	22.42	2*n*	β^6	...12

3209. **Σ 869.** Fixed. B is SD (9°) 1351. 5 3

1868.98	278°9	24″24	4*n*	Δ
1888.04	279.2	24.58	2*n*	Toulouse

[Ma (*F. S.* **II**)...En...Δ (**II**)...*Annals Toulouse Obsy.* **III**...]

3213. **H 720.** I could not find any such pair here with the 40-inch in 1904. 5 16

[β^6...]

$5^m\ 27^s$ **3214.** **Σ 871.** No motion.

1868.55	305°5	7″20	4*n*	Δ
1880.04	307.3	7.47	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...Cin^6...β^3...]

5 28 **3215.** **A. G. 107.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546).

5 31 **3216.** **Ho 513.** The only later measures are:

1901.41	3°3	1″51	3*n*	Doo

[Ho (3557)...Doolittle (*A. J.* 547)...]

5 39 **3217.** **A 56.** The only other measures are:

1902.71	54°1	1″32	2*n*	Gr. Obsy.

[A (3668)...Lewis and Bowyer (*Mon. Not.* **LXIII**, 403; **LXIV**, 793)...]

5 43 **3219.** **H 2301.** "In Cluster VII, 25." The only observations are:

1867.08	133°5	9″29	1*n*	Hd
1904.76	350.9	9.73	1*n*	β^6

I could not find the pair measured at Hd. It is not near this place.

5 47 **3220.** **A. Clark 3.** Discovered by Alvan Clark in 1854 with the 7½-inch. No evidence of motion since 1854.

1875.71	169°8	0″97	3*n*	Δ	6.2...8.3
1892.07	173.8	0.87	3*n*	β	7.2...8.7
1897.98	174.8	1.00	4*n*	A	

[Da^3...J^3...Δ (**I**)...β (3141) (*Pub. L. O.* **II**)...Pl...Da (*Mon. Not.* **XVII**, 257)...A (*A. J.* 429)...].

6 11 **3222.** **See 62.** The only later measures are:

A and B	1899.46	111°5	0″35	2*n*	Cg
AB and C	1899.46	325.1	24.48	2*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

6 12 **3223.** **A. G. 108.** Double in *A. G. Lund.* Measures by β^6.

6 28 **3224.** **β 1017.** Discovered with the 18½-inch. The later measures show no motion.

1898.16	159°2	0″67	4*n*	Doo
1903.14	160.4	0.60	1*n*	A
1904.20	161.7	0.6±	1*n*	Biesbroeck

[β (**XIII**)....β^3 (App.)....β (3141) (*Pub. L. O.* **II**)....Doolittle (*Pub. Flower Obsy.* **I**)....Biesbroeck....]

6 33 **3225.** **Σ 873.** No change unless distance larger.

1869.03	293°0	8″17	4*n*	Δ
1904.84	293.8	8.47	2*n*	β

[Ma (*F. S.* **I**)..Ma (**XIII**)...Δ (**II**)...β^6...

3227. **Σ 875.** "*Red: very green,*" H. Later measures make the distance less. $6^m\ 37^s$

1869.51	330°8	5″40	4*n*	Δ
1880.56	331.2	5.62	2*n*	β
1905.07	330.2	4.98	1*n*	β

[Ma (*F. S.* **I**)...H (**VIII**)...Δ (**II**)...β^3...β^6...]

3228. **See 63.** Later measures are: 6 42

1899.85	165°6	17″00	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

3229. **OΣ (App) 70.** The components are Piazzi VI. 13 and 14. No material change. 6 49

1892.35	177°8	116″17	4*n*	Franz

[Δ (**I**)...Franz (3464)...]

3233. **Lewis 7.** Approximate place, and not identified in DM (*Mon. Not.* LXI, 486). 7 :

3234. **Σ 866.** No change in either star. 7 4

A and B

1867.17	194°2	17″93	3*n*	Δ
1903.70	194.8	17.93	3*n*	β

A and C

1867.17	265°3	79″21	3*n*	Δ
1903.72	265.9	79.56	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...β^6...]

3235. **Ho 23.** (AB = **S** 509.) B is W^1 VI. 149. The only other measure of AB is: 7 23

1905.07	198°0	170″30	1*n*	β

[Ho (2778)...β^6...] (See p. 1067)

3236. **H 3839.** "Strongly suspected to be double." I could not see it with the 6-inch in 1876. Looked for with the 40-inch, and identified as given. The R. A. in Herschel is 1^m too large. 7 26

1904.00	274°8	10″63	2*n*	β^6	9.5...13.8

3237. **A 666.** A 14m star 24″4 from A in 231°8. 7 26

[A (*Bul. L. O.* No. 61)...]

3238. **Σ 872.** (= **S** 511.) Fixed. 7 34

1865.64	218°2	10″88	3*n*	Δ
1893.06	216.7	10.99	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**VII**)...Da^2...Wr...Ra (**XXIII**)...Bl (**V**)...OΣ (**IX**)...Du...Δ (1118)...Δ (**I, II**)...Seagrave (*Sid. Mess.* **II**, 274)...Je (2449)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

7^m 38^s **3239.** *η Geminorum.* **β 1008.** Discovered with the 12-inch on Mt. Hamilton in 1881. The measures show slow retrograde motion. Auwers gives the proper motion of this star 0″.072 in the direction of 267°.6, and obviously this is common to both components.

In 1852 Gillis observed a double or peculiar occultation of this star (*A. N.* 813), which he explains as the temporary eclipse of the star by a projecting lunar mountain. Tatlock (*Sid. Mess.*, IV, 18) has shown that on another occasion the same observer saw this star occulted.

This star is a spectroscopic binary, discovered by Campbell at the Lick Observatory (*Bul. L. O.* No. 20).

The following are all the measures:

1882.05	301°.4	0″.96	5*n*	β
1883.28	300.2	0.83	4*n*	Hl
1886.34	289.3	0.89	3*n*	Ho
1887.17	291.3	1.05	5*n*	Sp
1888.15	291.7	0.97	5*n*	Sp
1889.07	289.7	1.01	4*n*	Sp
1889.14	294.8	1.04	3*n*	β
1890.93	296.1	1.08	3*n*	β
1893.22	291.9	0.99	5*n*	Sp
1894.22	289.7	0.99	2*n*	Sp
1896.22	289.6	1.05	2*n*	Sp
1897.17	291.5	1.24	1*n*	Sp
1900.24	296.6	0.88	1*n*	Lewis
1904.12	287.8	1.19	2*n*	Biesbroeck

[β (**XIII**)...β^3...β (2930, 3048) (*Pub. L. O.* **II**)...Ho (2978)...Hl (**II**)...Sp (**III**)...Clerke (*Observatory* **XXV**, 389)...Lewis (*Mon. Not.* **LXI**, 486)...Biesbroeck...]

7 44 **3240.** **OΣ (App) 71.** The only measures since Dembowski are:

1903.01	310°.6	89″.56	3*n*	β^6

7 46 **3241.** 71 *Orionis.* **H 2302.** The principal star has a proper motion of 0″.203 in the direction of 213°.4 (Auwers). Engelhardt measures two other small stars. The change in distance is explained by the proper motion of A.

1886.21	202°.4	31″.98	2*n*	Eng
1887.52	200.8	32.05	6*n*	T
1900.76	202.7	29.29	2*n*	β

[T (2899)...Engelhardt (**II**)...β^5...]

7 52 **3242.** *Orionis* 277. **Σ 877.** (= **S 510.**) Fixed.

1868.07	262°.8	5″.39	4*n*	Δ
1890.02	261.4	5.53	4*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Bp...Ba (**II**)...Ra (**XXIV**)...Wr...Se...Se^3....Δ (1118)....Δ (**I, II**)....Pl....Giacomelli (**I**)....*A. G. Leipzig* p. 207....*Annals Toulouse Obsy.* **III**...]

8 16 **3244.** **See 64.** Later measures at the Lowell Observatory are:

1899.80	68°.5	7″.55	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

3245. **OΣ 135.** A single measure by OΣ. Later some doubt is expressed as to the existence of the small star. Ma(XI) by three doubtful and very discordant measures gives, 34°.8 : 0″.3 (1843.73). Δ found it single in 1866. I could not detect the slightest elongation with the 6-inch on a first-class night in 1873, and it was certainly single with the 18½-inch in 1879. HΣ saw it single in 1894; and Hussey found it perfectly round with the 36-inch in 1899. It is probably not double. 8^m 22^s

[Ma (**XI**)...Δ (**I**, p. 228)...OΣ (**IX**)...β^3... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

3246. **H 383.** "Beautiful and delicate. Both very *ruddy*." 8 34
I have tried to identify this pair, and measured a faint double about 6′ *s* of Herschel's place.

1904.85	32°.0	8″.53	2*n*	β^6	9.6...9.6

This is SD (2°) 1526, and its place for 1880 is:

R. A. = 6^h 8^m 34^s.6
Decl. = −2° 45′.5

There is another pair (= SD (2°) 1528) 44^s *f* and 2′ *n* of the other:

1904.86	54°.0	5″.70	1*n*	β^6	9.0...12.5

It will be noticed that both are unlike the pair described by H. Nothing else found in the vicinity.

3247. **Σ 879.** (= **H 382.**) Later measures make the distance less, but show no motion. 8 37

1846.26	67°.7	7″.54	2*n*	Ma
1867.93	71.6	7.46	3*n*	Δ
1903.70	69.4	7.45	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Flm...Δ (**II**)...β^6...]

3248. *Monocerotis* 21. **β 566.** Discovered with the 18½-inch. This star is 6m in L and SD. Lalande 11916. The only later measures are: 8 41

1892.07	209°.9	1″.87	3*n*	β	6.5...12.5

[β (**X**)...β^1...β (3141) (*Pub. L. O.* **II**)...]

3250. **Σ 876.** Change uncertain. 8 44

1868.54	50°.3	7″.80	4*n*	Δ
1905.05	46.9	8.08	1*n*	β

[Ma (*F. S.* **I**)...Bl (**V**)..Δ (**II**)...β^6...]

3251. **β 323.** Discovered with the 6-inch. Without change. 8 44

1876.17	93°.1	2″.17	2*n*	Hl
1878.05	93.5	2.16	2*n*	Cin
1888.18	96.3	2.13	2*n*	Hl
1889.07	96.9	2.26	3*n*	Lv

[β (**VI**)...β (2062)...Δ (**I**)..Cin^5...Lv^1...Hl (**I, II**)...]

(See p. 1067)

3253. **Σ 868.** Fixed. 8 49

1866.04	42°.9	3″.31	3*n*	Δ
1879.18	43.1	3.56	2*n*	Do
1905.03	42.6	3.33	1*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^6...]

8m 50s **3254.** **Σ 880.** Probably unchanged.

1866.31	55°8	5″25	3*n*	Δ
1877.61	55.6	5.47	4*n*	Sp
1903.28	54.3	5.26	2*n*	Biesbroeck

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Ra (**XXIV**)...Se...Se3...Hd...WS...WS2...Gl...Δ (**II**)...Sp (**II**)...*A. G. Leipzig*, p. 207...*Annals Toulouse Obsy.* **III**...Biesbroeck...]

9 0 **3255.** 5 *Monocerotis.* **H 384.** Nothing since Herschel except the following:

1905.05	27°2	51″43	1*n*	β6	...13

9 9 **3256.** **β 193.** Discovered with the 6-inch. The only later measure is:

1898.84	91°3	17″83	1*n*	β

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β (3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...]

9 27 **3258.** **β 894.** Discovered with the 18½-inch. This star has a proper motion of 0″089 in the direction of 37°2 (*A. G. Berlin*). At the date of the last measure, in 1898, the companion if fixed should have been 152°9 : 5″79. It is therefore certain that the two stars are moving together.

1898.15	133°8	5″24	4*n*	Doo

[β (**XIII**)...β3...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1067)

9 29 **3259.** **β 1018.** Discovered with the 18½-inch. Wrongly identified in *Pub. Y. O.* I. No motion. The later measures are:

1899.02	53°6	5″92	1*n*	β
1903.14	52.6	5.80	1*n*	A

[β (**XIII**)...β3 (App)...β (3114) (*Pub. L. O.* **II**)...]

9 34 **3260.** *Monocerotis* 23. **β 567.** Discovered with the 18½-inch. Probably unchanged. In Lalande, Heis, and Argelander 6m. Lalande 11949.

1892.00	246°8	3″97	3*n*	β	7.1...10.9
1898.10	242.4	4.26	2*n*	Doo	6.0...11.0
1898.86	245.2	4.21	2*n*	β	6.7...10.2

[β (**X**)...β1...β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9 53 **3263.** **Innes 349.** Discovered by Innes at the Cape of Good Hope.

1901.02	44°7	6″96	1*n*	Innes

(Innes (*Mon. Not.* **LXI**, 585; **LXII**, 473; **LXIII**, 76)...]

10 7 **3264.** **β 1019.** Discovered with the 18½-inch. There is a small error in the place given in *Pub. Y. O.* I. Unchanged.

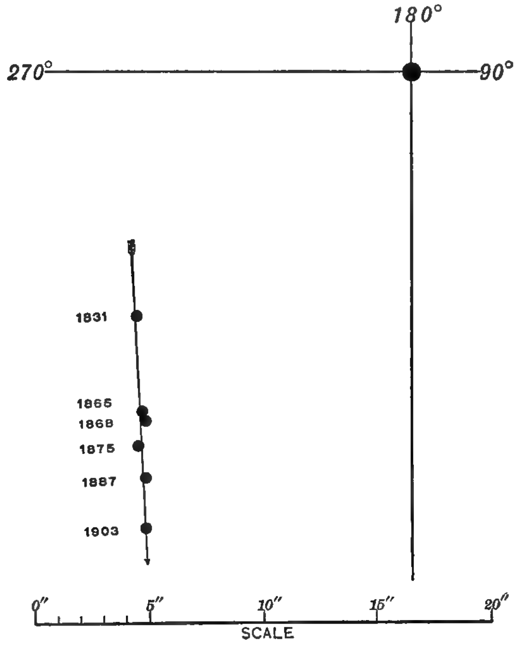
1898.88	277°6	0″80	1*n*	β
1903.14	271.1	0.73	1*n*	A

[β (**XIII**)...β3 (App)...β (3141) (*Pub. L. O.* **II**)...]

3266. **H V. 23.** The place in H is erroneous both in R. A. and Decl. The only observation since 1793 is: 10m 12s

1903.00	228°7	44″64	2*n*	β6	8.0...10.0

3267. **Σ 878.** Change from proper motion. The measures of Σ and β give 0″129 in 182°6 for the proper motion of A. 10 13



Σ 878

1831.30	311°7	16″19	2*n*	Σ
1865.34	321.8	19.12	5*n*	Δ
1868.36	322.9	19.39	2*n*	Δ
1875.11	324.0	20.39	1*n*	Δ
1887.37	326.8	21.43	1*n*	HΣ
1903.69	329.9	23.24	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...Δ (1572)...Flm...Gl...Bl (**V**)...HΣ (**XII**)...β6...]

3270. **Σ 885.** Unchanged. 10 26

1867.40	298°0	9″85	3*n*	Δ
1904.90	298.1	10.11	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...β6...]

3271. 75 *Orionis.* **β 96.** The faint double companion was noted with the 6-inch. Auwers gives the proper motion of A 0″060 in 191°3. The following are all the later measures: 10 29

C and D				
1892.12	227°0	5″10	2*n*	β
1898.92	224.3	4.79	1*n*	β
A and C				
1898.79	159°2	119″32	1*n*	β
A and B				
1898.79	256°0	62″83	1*n*	β

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β1...β (3141) (*Pub. L. O.* **II**)...]

10m 46s **3274.** **Σ 883.** Unchanged.

A and B

1867.30	263°6	3″26	3*n*	Δ
1905.05	264.2	3.26	1*n*	β

A and C

1867.30	258°0	28″38	3*n*	Δ
1905.05	257.8	28.17	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Δ (**II**) . . . β^{6} . . .]

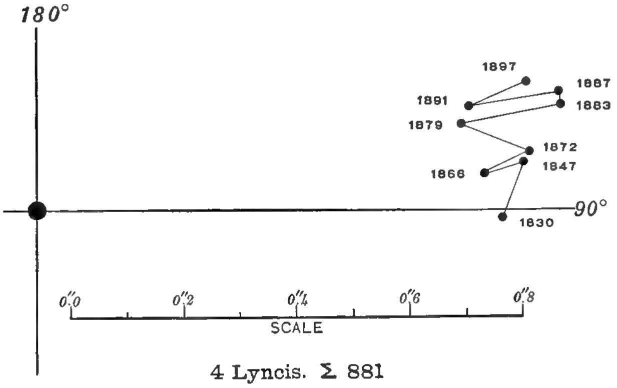
11 7 **3275.** **β 18.** Discovered with the 6-inch. Apparently fixed.

1877.97	273°5	1″54	1*n*	Cin
1885.14	276.9	1.77	1*n*	W
1886.52	275.9	1.68	1*n*	LM
1892.93	273.5	1.21	1*n*	J

[β (I) . . . β (*Mon. Not.* **XXXIII**, 351) . . . Δ (I) . . . Cin^{4} . . . Wilson (Cin^{10}) . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . .]

(See p. 1067)

11 24 **3277.** 4 *Lyncis.* **Σ 881.** Very slow direct motion in angle, the distance remaining constant. The components have a proper motion of 0″025 in 293°6 (*A. G. Hels.*).



4 Lyncis. Σ 881

1830.28	89°0	0″81	4*n*	Σ
1847.52	95.6	0.87	14*n*	OΣ
1866.64	94.4	0.80	3*n*	Δ
1872.41	96.4	0.88	3*n*	Δ
1879.30	101.2	0.77	3*n*	Hl
1883.80	101.2	0.95	5*n*	En
1887.33	102.5	0.95	3*n*	T
1891.06	103.2	0.79	3*n*	Hl
1897.99	104.5	0.90	2*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . Da^{2} . . . Da^{3} . . . Se . . . OΣ (**IX**) . . . Flm . . . Δ (1110) . . . Δ (**I, II**) . . . Bl (**V**) . . . Sk . . . Sk^{5} . . . Hl (**I, II**) . . . En (2663) . . . T (2898) . . . Maw (**I, IV**) . . . Big (*Bul. Ast.* **XII**, 299) . . . Hu (*A. J.* 427) . . . Lewis (*Mon. Not.* **LIX**, 400; **LXI**, 486) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . HΣ (**XII**) . . .]

11 30 **3279.** **Ho 24** The only later measure is:

1897.13	154°7	3″78	1*n*	Ho

[Ho (2778, 3558) . . .] (See p. 1067)

11 32 **3280.** **Σ 884.** (= S 512.) Fixed.

1866.29	270°6	8″84	3*n*	Δ
1901.07	271.2	9.17	1*n*	Espin

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . Bl (**V**) . . . Seagrave (*Sid. Mess.* **II**, 274) . . . Espin (*Mon. Not.* **LXIV**, 676) . . .]

3281. **Σ 886.** Apparently unchanged. 11m 40s

1869.44	184°4	6″56	4*n*	Δ
1904.90	186.4	6.40	2*n*	β

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . β^{6} . . .]

3284. **H 2307.** The only measure is: 11 48

1900.12	92°0	22″40	1*n*	Es	8.6 . . . 11.5

[Espin (*Mon. Not.* **LXIV**, 678) . . .]

3287. **H 3845.** "Large star *ruddy.*" In Lalande 6½ m, but about 7½, 1876. The principal star has a proper motion of 0″324 in 143°3 (Porter). 12 0

1898.12	21°5	34″26	3*n*	Doo

[Doolittle (*Pub. Flower Obsy.* **I**) . . . Innes (*Mon. Not.* **LXIII**, 76) . . .]

3288. **H V. 55.** "Near 12 *Geminorum;* no other indication." The 7.5m star in this place has a 10 m companion, 59°3 : 62″8 (1903.84). There are many wide pairs in the vicinity, but in the absence of a better description it is impossible to say which is the Herschel pair. The 7.5 m star has a small proper motion, 0″033 in 44°3 (*A. G. Berlin*). 12 4

3289. **Σ 882.** Probably unchanged. 12 6

1868.64	270°7	3″87	4*n*	Δ
1905.05	273.0	3.82	1*n*	β

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . Bl (**V**) . . . β^{6} . . .]

3290. **Ho 230.** No other measures. 12 6

[Ho (2977) . . .] (See p. 1067)

3291. **β 895.** (AC = **Σ 888.**) The duplicity of the principal star of Σ 888 was suspected with the 6-inch, and verified five years later with the 18½-inch. Rapid motion would be expected in a pair of this class, and it may prove to be a binary of short period. Only the largest apertures will show any difference of magnitude in the components. In 1828 Herschel (*Seventh Catalogue, Mem. R. A. S.,* xxxviii) noted, "the large star suspected to be a close double." This remark seems to have attracted no attention; at all events the close pair was missed by Σ and other observers who measured C. 12 23

A and B

1873.9	Elongation suspected in 250° with 6-in.			β	
1875.9	Appeared round with 18½-in.			β	
1879.00	Elongated in 120°, 18½-in.			β	
1879.22	133°3	0″27	1*n*	β	7.5 . . . 7.5
1887.17	143.5	0.25 ±	3*n*	Sp	
1888.94	150.9	0.2 ±	5*n*	Sp	
1891.18	144.6	0.22	3*n*	β	8.2 . . . 8.3
1891.78	146.0	0.21	3*n*	β	8.1 . . . 8.3
1899.15	167.9	0.28	2*n*	Lewis	
1900.19	156.9	0.29	4*n*	A	
1902.22	160.5	0.25	4*n*	Gr. Obsy.	
1904.18	167.5	0.22	2*n*	A	

There is no change in the Struve companion. Some of the measures are:

AB and C (= Σ 888)

1831.22	246°2	2″70	3*n*	Σ
1869.83	249.8	2.95	4*n*	Δ
1879.22	250.3	2.83	1*n*	β
1888.94	252.9	2.69	2*n*	Sp
1891.22	250.2	2.87	2*n*	β
1898.28	250.0	2.97	3*n*	Doo
1898.59	251.8	2.73	2*n*	Lewis
1900.19	251.9	3.08	2*n*	A

[β (**XIII**) ... β^3 ... β (3114) (*Pub. L. O.* **II**) ... Sp (**III**) ... Ma (*F. S.* **I**) ... Se ... HΣ (**XII**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXIII**, 403; **LXIV**, 793) ... Biesbroeck ... A (*Bul. L. O.* No. 11) ...]

(See p. 1067)

$12^m 28^s$ **3294.** **Σ 889.** Perhaps change in angle.

1865.42	225°6	21″56	3*n*	Δ
1893.12	228.4	20.88	2*n*	Gla
1895.20	229.2	21.53	2*n*	HΣ
1905.07	229.9	21.42	1*n*	β

[Ma (*F. S.* **I**) .... Δ (**II**) .... Glasenapp (**II**) .... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**) ... β^6 ...]

12 31 **3295.** **H 385.** Herschel saw only the distant companion, E. The principal star was noted "dupl.?" in *A. G. Berlin*. In measuring this, I found two other very faint companions. H estimated AE, 60°: 12″: 9 ... 12. The only other measure of any of the components is:

1902.18	49°4	1″63	3*n*	Cogshall

[Cogshall (*A. J.* 546) ... β^6 ...]

12 34 **3297.** **A. G. 109.** Double in *A. G. Berlin*. Measures by Hussey (*Bul. L. O.* No. 44).

12 38 **3298.** **OΣ (App) 73.** B is Lalande 12039. Probably unchanged. The 40-inch shows a 13m star near A, 29°5 : 15″3.

1904.83	44°5	72″97	2*n*	β

[Δ (**I**) ... β^6 ...]

12 47: **3300.** **Σ 892** *rej.* From H (VI). Magnitudes in *Catalogus Novus*, 8 ... 8-9. Δ (II, p. 154) refers to this, and gives magnitudes, 10.5 ... 11.5.

12 57 **3301.** **Σ 891.** Fixed.

1869.22	293°6	21″92	4*n*	Δ
1904.83	293.6	22.09	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII**) ... Δ (**II**) ... Gl ... β^6 ...]

13 3 **3302.** **Ho 338.** No other measures.

[Ho (3233) (*A. J.* 215) ...]

(See p. 1067)

3303. **OΣ (App) 74.** B is Lalande 11043. No change. $13^m 12^s$

1894.08	264°2	57″99	4*n*	Franz

[Δ (**I**) ... Franz (3464) ...]

3305. **OΣ (App) 75.** No motion. 13 33

1893.07	127°6	47″27	3*n*	Franz

[Δ (**I**) ... Franz (3464) ...]

3307. **H 3847.** The absence of any bright star in this place and the remarkable agreement of the description with that of Ho 231, made it almost certain that there was an error of 2° in Herschel's declination, and this is confirmed by a recent examination with the 40-inch (see No. 3309). 13 41

3309. **Ho 231.** (= **H 3847.**) There is an error of 2° in Herschel's declination of H 3847. There is no double star in that place. The only later measures are: 13 45

1904.84	47°7	6″38	2*n*	β

[Ho (2977) ... β^6 ...]

(See p. 1067)

3311. **OΣ (App) 72.** C is Rad^1. 1711. No motion. 13 51

1882.90	321°6	134″36	4*n*	Franz

[Δ (**I**) .. Franz (2649) ...]

3313. **S 513.** (= **OΣ** (App) **76**; BC = **OΣ 137** *rej.*) The small star not in S. Not seen by Δ in 1866. I found it very difficult with the 6-inch in 1874, and much smaller than 10m. The principal star is P VI. 62, and has a proper motion of 0″101 in 270° (*A. G. Berlin*). No change in AB. 14 4

A and B

1872.30	257°5	59″45	3*n*	Δ	7.2 ... 8.5
1893.96	257.6	59.28	4*n*	Franz	7.1 ... 8.4
1899.01	258.1	59.75	3*n*	Hu	
1905.13	257.9	59.20	2*n*	β	

The only later measures of BC show possible change:

1899.01	83°7	15″22	3*n*	Hu	
1905.09	85.3	14.75	2*n*	β	... 12.0

[Ma (**XI**) ... Δ (**I**, pp. 228, 248) ... Franz (3464) ... Hu (*Pub. L. O.* **V**) ... β^6 ...]

3314. **β 1296.** Discovered with the 40-inch in measuring H 2315, 58^s *f* and 3′2 *s*. 14 6

[β^6 ...]

(See p. 1067)

3316. **Hn 79.** Discovered by Holden at the Washburn Observatory. Measures by Comstock. 14 13

[*Pub. Washburn Obsy.* **II**, **VI** ...]

3317. **S 516.** C is Lacaille 2219. The only later observation is: 14 21

1902.88	4°7	62″91	2*n*	β^6	7.5 ... 7.9

14^{m} 21^{s} **3318.** **H** 386. "Triple; C 10m and *sf.*" (See p. 1067)

14 23 **3319.** Σ 895 *rej.* From H (V); *orange : fine blue.* Another observation in H (V), 59°8 : 40″ ± : 8-9 . . . 11; *very red : blue.* In H (VII) called *red : green.* Colors not especially prominent with the 40-inch. The only recent measure is the following:

1904.79	58°5	28″90	2*n*	β^{6}	8.3 . . . 9.8

14 33 **3322.** OΣ 136. No motion.

1869.82	78°7	5″55	4*n*	Δ
1899.23	80.6	5.67	3*n*	Hu

[OΣ (**IX**) . . . Δ (**I**) . . . Hu (*Pub. L. O.* **V**) . . .]

14 55 **3324.** **Ho** 232. A 7m star 45^{s} *p* and 2′ *n.* No other measures.

[Ho (2977) . . .] (See p. 1067)

14 57 **3325.** Σ 897. (= S 515.) No material change.

1867.30	347°8	17″91	3*n*	Δ
1893.12	347.9	17.84	2*n*	Gla

[Ma (*F. S.* **II**) . . . H (**II**) . . . Δ (**II**) . . . Glasenapp (**II**) . . .]

14 57 **3326.** **Ho** 25. Probably without change.

1897.15	240°2	0″74	2*n*	Ho
1903.19	250.9	0.89	1*n*	Bowyer

[Ho (2778, 3234, 3558) . . . Bowyer (*Mon. Not.* **LXIV**, 793) . . .]

15 6 **3327.** **H** 2315. "The only double star in cluster VII. 20." The distance in H is much underestimated. In measuring this, a close pair in the field was found (No. 3314). The only measure of the Herschel pair is:

1901.83	2°6	6″36	2*n*	β^{5}	11.7 . . . 11.7

15 18 **3328.** Σ 898. Unchanged.

1867.02	119°6	6″04	3*n*	Δ
1904.83	120.7	6.10	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . β^{6} . . .]

15 41 **3329.** **Jacob** 3. Probably fixed.

1877.15	206°7	13″13	2*n*	Cin	8.0 . . . 9.2

[J^{3} . . . WJ . . . Cin^{4} . . .]

15 42 **3330.** *μ Geminorum.* **β** 1059. The duplicity of this distant companion to *μ Geminorum* was discovered with the 36-inch. There are many faint stars less distant from A, one of which was measured by me, 76°6 : 72″66 (1880.01) 2*n.* Auwers gives the proper motion of the large star as 0″116 in the direction of 153°8. With this movement the minimum distance of the double companion of 26″7 will be reached in a little more than one thousand years.

The later measures are:

B and C

1899.12	270°8	0″68	1*n*	A	10.0 . . . 11.0

A and BC

1899.08	141°3	121″71	2*n*	β

[β (**XV**) . . . β (2929) (*Pub. L. O.* **II**) . . . β^{3} . . . A (3638) . . .]

15^{m} 46^{s} **3331.** **β** 1020. Discovered with the 18½-inch. The later measures show no motion.

1891.22	158°5	1″27	2*n*	β
1898.12	159.5	1.28	2*n*	A
1899.09	157.8	1.01	3*n*	Lewis
1901.62	160.2	1.11	2*n*	Lewis

[β (**XIII**) . . . β^{3} (App.) . . . β (3114) (*Pub. L. O.* **II**) . . . A (3584) . . . Greenwich Obsy. (*Mon. Not.* **LX**, 498; **LXI**, 486; **LXIV**, 793) . . .]

(See p. 1067)

15 49 **3332.** Σ 3116. **Lalande 12176.** Probably fixed, but the measures are discordant.

1831.16	19°2	4″48	5*n*	Σ
1864.73	23.9	3.85	5*n*	Δ
1882.12	21.5	4.26	1*n*	Wilson
1898.10	23.3	4.28	3*n*	Doo
1905.18	27.1	3.73	1*n*	β

[Ma (**XI**) . . . . J^{2} . . . . Flm . . . . Pt . . . . Cin^{5} . . . . Δ (1574) . . . . Δ (**II**) . . . . Wilson (Cin^{10}) . . . Gore (*Mon. Not.* **XLVII**, 61) . . . Searle (*A. J.* 299) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . β^{6} . . .]

15 50 **3333.** Σ 899. Fixed. Angle in Ra (XXIV) about 10° in error. Given in Hl (II) as discovered by Eastman.

1867.05	20°2	2″34	3*n*	Δ
1885.58	22.5	2.32	5*n*	Hl
1901.10	19.7	2.28	5*n*	Bowyer

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Δ (1118) . . . Δ (**I, II**) . . . Ra (**XXIV**) . . . Hl (*Wash. Obsns.* 1885, 1886) . . . Hl (**II**) . . . T (2991) . . . Glasenapp (**II**) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . . Bryant and Bowyer (*Mon. Not.* **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIII**, 403) . . .]

15 55 **3334.** **A. G. 110.** Double in *A. G. Lund.* Measures by β^{6}.

16 0 **3335.** OΣ 138 *rej.* From *Poulkowa Catalogue* of 1843. Dembowski observed it on 1*n*, 304°0 : 1″33 : 7.5 . . . 10.0 (1867.11), but on four subsequent nights, 1868-70, the companion was doubtful or invisible. Ma (XI) gave, 46°2 : 0″8 (1843.3) by a single measure which is marked "doubtful." Under the best conditions in 1874 I could not see any trace of a companion with the 6-inch, nor in 1879 with the 18½-inch. Hussey found it perfectly round with the 36-inch in 1899. The probabilities are that this star is not double.

[Ma (**XI**) . . . Δ (**I**) . . . β^{3} . . . Hu (*Pub. L. O.* **V**) . . .]

16 13 **3337.** **Ho** 233. Discovered at the Dearborn Observatory. No other measures.

[Ho (2977) . . .] (See p. 1067)

$16^{m}\ 20^{s}$ **3338.** 5 *Lyncis*. **S** 514. (= **♅** **VI.** 102 = **Σ** 894 *rej.*). The small star not in ♅ or S. Given from H (V).

The proper motion of the large star is given:

Kustner	0″024 in 221°1
A. G. Hels.	0.040 in 261.3

AB	1879.86	139°1	30″34	1*n*	β	6...10.5
	1900.11	138.4	30.82	2*n*	Es	...12.5
AC	1879.86	272.5	95.93	1*n*	β	... 8.5

[H (V)...β3...Espin (3717)...]

(See p. 1067)

16 21 **3339.** **Σ 896.** Fixed. This is given a proper motion of 0″047 in 90° (*A. G. Harvard*).

1868.69	82°5	19″34	4*n*	Δ

[H (V)...Ma (*F. S.* **II**)...Δ (**II**)..Bl (**V**)...]

(See p. 1067)

16 35 **3340.** **H** 726. "Triple; an exact equilateral triangle." Magnitudes not given. The place is that of the 9 m star, DM (8°) 1303. (See p. 1067)

16 39 **3341.** **Hu 702.** Later measures, which include the single position given in Part I, are:

1904.09	322°1	0″97	3*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

16 43 **3343.** **H 3850.** The only observation since Herschel is:

1883.92	43°4	15″58	1*n*	Wilson (Cin10)

16 54 **3345.** **Hu 703.** The mean of the position given in Part I and a later measure is:

1903.72	40°6	0″62	2*n*	Hu	9.0...9.8

[Hu (*Bul. L. O.* No. 65)...]

17 4 **3348.** **A. G.** 111. Double in *A. G. Leiden*. Measures by β6.

17 25 **3349.** 8 *Monocerotis*. **Σ 900.** (= **♅ III.** 29 = **♅ III.** 44 = **Sh** 69.) Fixed.

1867.89	26°8	13″71	4*n*	Δ

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**V**)...J2...Wr...Ma (324)...Ra (**XXVIII, XXXV, XXXVIII, XXXIX**)....OΣ (**IX**).... Pk....Δ (1204).... Δ (**I, II**).... Je (2346)...Glasenapp (**III**)...]

17 39 **3351.** **O. Stone** 13. From Cin5 No other observations.

18 19 **3353.** **OΣ** 139. Change uncertain. Secchi has a measure, 243°7 : 0″40 (1857.49), which evidently belongs to some other pair.

1843.23	132°5	0″77	1*n*	Ma
1870.38	313.9	0.70	5*n*	Δ
1895.16	323.6	0.45±	1*n*	HΣ
1899.50	329.2	0.40	4*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Flm...Δ (**I**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

3354. **Σ** 901. The small star from H (VII); not in Σ. AB fixed. $18^{m}\ 22^{s}$

1867.04	247°8	19″70	3*n*	Δ
1902.71	247.7	19.97	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI, XII, XIII**)....Hd....Δ (**II**).... Gl.... *A. G. Leipzig.* p. 207...]

3355. **β** 97. Discovered with the 6-inch. Without change. 18 29

1889.14	260°9	0″93	2*n*	Lv
1898.19	260.7	1.20	3*n*	Doo

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)... Δ (**I**)... Cin4... Cin5... Lv1... Doolittle (*Pub. Flower Obsy.* **I**)...]

3357. *Canis Majoris* 33. **β** 568. Discovered with the 18½-inch. Probably unchanged. Lalande 12288. 18 36

1889.07	148°3	0″63	3*n*	Lv
1891.88	154.2	0.86	1*n*	Collins
1892.93	156.1	1.07	1*n*	Jones
1898.24	158.8	0.58	1*n*	See

[β (**X**)...β1... Cin5... Lv1... Collins and Jones (*Proc. Haverford Coll. Obsy.* 1891, 1892)... See ( )...]

3359. **Σ** 903. No sensible change. 18 49

1868.60	295°0	22″80	4*n*	Δ
1878.19	294.3	22.73	1*n*	β
1902.74	294.6	23.23	1*n*	Hu

[Ma (*F. S.* **II**)...H (**VIII**)...Δ (**II**)...β1...]

3360. **S** 518. (= σ 223 = **♅ IV.** 80.) B is Lalande 12305. Declination in ♅ is 8′ too small. Change doubtful. 18 59

1783.06	87°6	17″98	1*n*	♅
1880.06	86.8	16.24	3*n*	β
1896.01	87.9	16.91	2*n*	Scott

[β3... Scott (*Brit. Ast. Ass'n* **VI**, 368)...]

3361. **β** 1191. Discovered with the 36-inch. The *Berlin A. G. Catalogue* gives the proper motion of this star 0″205 in the direction of 222°2. If this is substantially correct, another measure will show whether the components are moving together. No other measures. 19 8

[β (**XVII**)...β (3047)...β (*Pub. L. O.* **II**)...]

3366. **Σ** 902. No motion. 19 30

1866.85	150°2	11″80	3*n*	Δ
1902.83	149.5	11.85	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Δ (**I**)...]

3368. **β** 569. Discovered with the 18½-inch. Change uncertain. 19 37

1878.62	118°8	1″54	2*n*	Cin
1886.89	115.2	1.99	2*n*	LM
1898.10	115.5	2.07	3*n*	Doo

[β (**X**)...β1...Cin5...LM...Doolittle (*Pub. Flower Obsy.* **I**)...]

19^m 37^s **3369. Cordoba.** Double in *Cordoba Zones.* Measures from Cin^5.

19 41 **3370. Ho 339.** No other measures.

[Ho (3233)...] (See p. 1067)

19 45 **3372. OΣ 140.** Probably without change.

1843.22	124°6	2″36	2*n*	Ma
1867.52	119.3	3.04	4*n*	Δ
1879.19	122.6	2.70	1*n*	OΣ
1884.21	118.9	3.09	5*n*	En
1898.42	118.3	2.95	3*n*	Hu
1903.04	119.3	3.12	1*n*	Do

[Ma (**XI**)....OΣ (**IX**)...OΣ (**X**, p. 191)...Δ (**I**)...Flm...Pt...En (2786)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Sk...Sk^5...Do (3930)...]

20 **3373. Σ 893.** This was identified as DM (79°) 207. It is 27^s *p* and 4′2 *n* of the 6.3m star, DM (79°) 208. Without change.

1865.53	46°9	16″87	3*n*	Δ
1898.42	47.6	17.58	3*n*	Doo
1905.03	48.8	17.15	1*n*	β

[Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

20 8 **3374. A. G. 112.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546).

20 16 **3375. Σ 904.** Without change.

1868.86	165°5	4″93	4*n*	Δ
1902.97	165.3	5.29	1*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)..H (**V**)...Bl (**V**)...Δ (**II**)...]

20 26 **3377. Σ 907.** (= **H** 389.) Fixed.

1867.90	302°3	11″79	3*n*	Δ
1880.03	302.2	11.94	2*n*	β
1903.01	301.8	12.19	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...]

20 31 **3379. Σ 905.** Apparently without motion.

1844.27	118°5	1″93	3*n*	Ma
1868.38	120.6	2.03	4*n*	Δ
1902.97	123.2	2.03	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...]

20 33 **3380. Σ 911.** Probably unchanged.

1867.24	157°1	13″23	3*n*	Δ
1902.73	157.2	13.19	2*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...]

20 34 **3381. Σ 906.** Without change.

1866.98	335°3	6″26	3*n*	Δ
1902.83	336.6	6.62	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^2...Δ (**II**)...WS...Gl...]

3382. Σ 910. Probably slow retrograde motion in the close pair, but its distance from A is unchanged. 20^m 36^s

B and C

1857.12	165°6	0″6 ±	2*n*	Se
1869.14	165.6	0.7 ±	4*n*	Δ
1878.20	162.5	0.93	1*n*	β
1894.68	162.4	0.65 ±	2*n*	HΣ
1898.10	160.2	0.89	3*n*	Doo
1902.74	158.6	0.66	1*n*	Hu

A and BC

1867.49	151°1	66″59	3*n*	Δ
1902.74	150.9	66.55	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...WJ^2...J^3...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...Δ (**II**)...Pt...β^1...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

3383. 15 *Geminorum.* **Sh 70.** (= **H̥** **V.** 52 = **H̥** **V.** 56 = σ **224.**) The bright star has a proper motion of 0″058 in 237°8 (*A. G. Berlin*). 20 37

1841.23	205°9	32″16	1*n*	OΣ
1878.21	205.1	30.26	2*n*	OΣ
1879.85	205.8	30.46	3*n*	Doubiago
1898.30	204.2	29.64	3*n*	Doo
1905.11	204.5	29.05	2*n*	β

[WJ^2...Ra (**XXIII**)...OΣ (**X**, p. 127)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

3384. A. G. 113. Double in *A. G. Leiden.* Measures by β^6. 20 38

3385. Σ 909. Some change in the position-angle and distance. 20 42

1830.14	97°2	12″97	4*n*	Σ
1844.28	97.6	12.08	1*n*	Ma
1867.96	93.0	13.35	3*n*	Δ
1895.29	89.7	13.64	2*n*	HΣ
1902.69	88.4	14.17	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...HΣ (**XII**)...] (See p. 1067)

3388. Σ 914. (= **H** 39.) Without change. (See No. 3401.) 20 57

1867.05	298°2	21″01	3*n*	Δ
1902.74	298.1	21.15	1*n*	Hu

[Ma (*F. S.* **II**)...En...Δ (**II**)...]

3389. H 2317. This number of H is erroneously attached to the star immediately following in his *Fifth Catalogue*, which is Σ 908. 20 57

3390. Σ 913. Fixed. 21 2

1867.45	48°0	31″30	3*n*	Δ
1905.07	48.5	30.91	1*n*	β

[H (**VI**)...Ma (*F. S.* **II**)...Δ (**II**)...β^6...]

3391. Σ 908. Probably without change. 21 7

1868.91	358°0	8″08	4*n*	Δ
1903.01	356.5	8.47	1*n*	Hu

[H (**V**)...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

21^{m} 38^{s} **3392.** **Σ 912.** Probably no motion.

1867.95	26°.6	3″.14	3*n*	*Δ*
1902.96	26.5	3.40	1*n*	Hu

[Ma (*F. S.* I)...H (**VI**)...Ma (**XI**)...*Δ* (**II**)...]

21 50 **3395.** **Schj. 4.** From list of new pairs by Schjellerup.

1905.07	358°.3	63″.12	1*n*	β^{6}	9.2...9.8

21 50 **3396.** **Σ 915.** (= **♅ II. 89 = S 520.**) Σ speaks of a third star, 12 m, Cl. IV, at 125°. No material change in the principal pair since ♅. H (V) observed a pair for this, 29°.5: 10″± : 10–11...12 (1830+). I could find only Σ's. The third star very plain. Ma gives P = 124°.7 (1843).

1867.72	41°.8	5″.73	4*n*	*Δ*
1893.18	42.6	5.91	2*n*	Gla
1902.73	42.0	6.34	2*n*	Hu

[Ma (*F. S.* I)...H (**V**)...Ma (**XI**)...*Δ* (**II**)...Glasenapp (**II**)...*A. G. Leipzig*, p. 247...]

21 50 **3397.** *ν Geminorum.* **β 1192.** (AB = **OΣ (App)** 77.) The duplicity of the distant companion was discovered with the 36-inch. This star is Lalande 12358. The principal star has a proper motion of 0″.0315 in the direction of 259°.0 (Auwers).

The following positions are derived from meridian observations:

1800	329°.7	111″.20	Lalande
1875	329.4	112.64	*A. G. Berlin*

The large telescope shows a number of faint stars nearer the primary than BC. The nearest is the only one seen with any difficulty.

The following are all the later measures of the close pair:

B and C

1899.52	344°.3	0″.20	2*n*	A
1900.24	340.6	0.16	1*n*	Bryant

A and BC (= OΣ (App) 77)

1890.86	329°.3	112″.69	3*n*	*β*
1895.53	329.5	112.87	3*n*	Franz
1899.08	329.6	112.71	2*n*	*β*

[*β* (**XVII**)...*β* (3047)...*β* (*Pub. L. O.* **II**)...*Δ* (I)...Franz (3464)...A (3638)...Bryant (*Mon. Not.* **LXI**, 489)...]

21 52 **3398.** **A. G. 114.** Measures from *A. G. Leipzig*, p. 247.

22 35 **3399.** **A. G. 115.** Double in *A. G. Leiden.* Measures by β^{6}.

22 54: **3400.** **♅ N. 141.** I could not find any pair in this place. It is certainly identical with Weisse 12 (No. 3417).

22 54: **3401.** **♅ III. 43.** (= *σ* **227.**) Nothing found here; probably identical with Σ 914.

3402. 11 *Monocerotis.* **Σ 919.** (= **♅ I. 10 = ♅ II. 17 = Sh 71**: AD = **β 570.**) Relatively fixed. The distant companion was noted with the 18½-inch. The principal star, according to Auwers, has a proper motion of 0″.076 in the direction of 296°.4, and obviously the two Σ companions are moving with it, as there has been no relative change. 23^{m} 0^{s}

A and B

1867.88	132°.0	7″.37	3*n*	*Δ*
1878.38	131.2	7.23	5*n*	Sp
1898.96	133.4	7.44	1*n*	*β*
1903.16	131.6	7.26	5*n*	Jouffray

B and C

1867.88	103°.0	2″.54	3*n*	*Δ*
1878.38	104.9	2.76	5*n*	Sp
1898.96	108.4	2.95	1*n*	*β*
1903.19	105.7	2.75	1*n*	Biesbroeck

A and D

1898.90	55°.2	25″.63	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...WJ...J^{2}...Se...Se^{3}...Ba (**I**)...Wr...Ra (**XXIII**)...P^{1}...H (**V**)...*Δ* (1015, 1256)...*Δ* (**I, II**)...*Δ* (*Accad. Sci. Mem.*)...Gl...Du...Nobile (*Rend. della Arcad. Sci.* Napoli, Nov. 1875)...Cin^{6}...Pl...Je (2346)...Pk...Hl (**I, II**)...Hd...Sk^{3}...LM...Giacomelli (**II**)...T (2991)...Hayn (3051)...β^{1}...Glasenapp (**III, V**)...Knorre (3300, 3518)...Brown (3645)...Solá (3563)...Do (3798, 3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...Bryant (*Mon. Not.* **LIX**, 400; **LX**, 498)..Biesbroeck...]

3403. **Arg. 14.** Duplex in *O. Arg. N.* Examined and estimated as given (1876). (See p. 1067) 23 0

3405. **OΣ 141.** Fixed. 23 1

1868.54	140°.9	2″.47	4*n*	*Δ*
1898.61	142.4	2.36	3*n*	Hu

[OΣ (**IX**)...*Δ* (I)...Ma (**XI**)...Per...Per (2684)...Hu (*Pub. L. O.* **V**)...]

3409. **Ho 340.** No other measures. 23 25

[Ho (3233)...] (See p. 1067)

3410. **OΣ 142.** Without change. 23 27

1867.74	353°.4	8″.21	3*n*	*Δ*
1898.87	354.2	8.63	3*n*	Hu

[OΣ (**IX**)...*Δ* (I)...Hu (*Pub. L. O.* **V**)...]

3412. **♅ N. 111.** The only observation since 1795 is: 23 37

1905.07	167°.1	42″.48	1*n*	β^{6}

There are two faint stars nearer than the Herschel companion.

3414. *λ Canis Majoris.* **β 753.** Discovered with the 6-inch at Mt. Hamilton in 1879. The *Second Washington Catalogue* gives the proper motion, 0″.088 in the direction of 270°.0. The components are evidently moving together. 23 43

The following are all the later measures:

1893.14	37°.3	1″.16	2*n*	Sellors
1897.12	38.2	1.36	3*n*	A
1898.19	43.1	1.14	1*n*	See

[*β* (**XI**)...β^{2}...*β* (3141)(*Pub. L. O.* **I, II**)...Sellors (3240)...A (3465)...See( )...]

23^m $48^{:s}$ **3415.** Σ 917 *rej.* Since Part I was in type, I have identified this as the 9.3m star, DM (52°) 1094, the place of which is:

R. A. = $6^h 23^m 52^s$
Decl. = 52° 35′.5

1905.09	229°.7	27″.58	1*n*	β^6	9.0...10.0

23 48 **3416.** **β 896.** Discovered with the 18½-inch, but previously suspected to be a close pair with the 6-inch. These are all the later measures:

A and B

1901.79	191°.7	0″.96	2*n*	A

A and C

1899.05	210°.0	18″.18	1*n*	β
1901.78	211.3	18.50	1*n*	A

[β (**XIII**)...β^3...β (*Pub. Y. O.* **I**)...A (*Bul. L. O.* No. 11)...]

(See p. 1067)

23 57 **3417.** **Weisse 12.** Noted "duplex 6″–10″" in W^2. (See No. 3400.) The only measures are:

1903.01	64°.3	8″.47	2*n*	β^6	8.5...8.6

24 2 **3418.** **Σ 916.** Probably fixed.

1866.90	253°.4	9″.35	3*n*	Δ
1903.88	252.8	9.40	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

24 2 **3419.** **See 67.** Later measures are:

1899.04	212°.3	2″.48	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

24 8 **3420.** **β 1021.** Discovered with the 18½-inch. Change uncertain.

1900.20	84°.0	0″.85	3*n*	A
1900.70	84.7	0.73	8*n*	Lewis
1900.92	85.0	0.63	3*n*	Doo
1904.20	75.3	0.73	2*n*	Biesbroeck

[β (**XIII**)...β^3 (App)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIV**, 793)...A (*Bul. L. O.* No. 11)...Doolittle (*A. J.* 547)...Biesbroeck...]

24 8 **3421.** **Σ 920.** (= **H III. 98.**) No change since Struve.

1868.79	211°.2	9″.41	4*n*	Δ
1894.68	210.4	9.55	2*n*	HΣ
1902.74	209.9	9.64	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...HΣ (**XII**)...]

24 12 **3422.** **OΣ 143.** Probably fixed unless a small increase in distance. The large star has a proper motion of 0″.089 in 191°.1 (*A. G. Berlin*).

1867.29	102°.9	7″.87	3*n*	Δ
1884.06	101.6	8.16	3*n*	Per
1898.67	102.1	8.07	4*n*	Hu
1903.04	101.8	8.27	1*n*	Do

[OΣ (**IX**)...Ma (**XI**)...Δ (**I**)...Per...Per (2684)...Sk^3...Hu (*Pub. L. O.* **V**)... Do (3930)...]

3423. *Aurigae* 229. **Σ 918.** (= **S 519.**) There is no change in the distance, but later observers make the angle a little larger. The principal star is given a proper motion of 0″.033 in 270° (*A. G. Harvard*). 24^m 21^s

1870.38	325°.7	4″.47	5*n*	Δ
1871.59	327.1	4.31	7*n*	Du
1879.28	325.9	4.46	4*n*	Je
1888.96	328.8	4.38	2*n*	T
1900.09	327.3	4.73	2*n*	Espin
1903.16	328.5	4.55	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H^1...H (**V**)...Da^3...Ra (**XXIII**)...Wr ...Se...En (1673)...Ba (**II**)...Du...Gl...Sk^2...WS^2...Sk^5...Δ (1110, 1256)...Δ (**I, II**)...Flm...Bl (**V**)...Je (2346)...Big...T (2991)...Maw (**I**)... Big (*Bul. Ast.* **XII**, 299)....Ebell (3321)....*Annals Toulouse Obsy.* **III**.... Espin (*Mon. Not.* **LXII**, 528)...Do (3798, 3930)...Je (3802)...Coleman (*Mem. R. A. S.* **LIV**)...]

(See p. 1068)

3424. **H IV. 28.** There is no such pair in this place, nor any double near except OΣ 143. The measures of that do not make it probable that it could have answered this description in 1782. The only pair I could find at all agreeing with this was Σ 924. There is but little doubt of the identity of the two, there being a large error in the Decl. of H. 24 24:

3425. **H 3863.** In O. Arg. S. 6m. The only measures are: 24 24

1877.11	115°.3	2″.74	2*n*	Cin^4	7.0...8.8

(See p. 1068)

3426. **OΣ 519.** No material change. Measured as new by Δ (1736). 24 25

1868.23	77°.8	8″.14	6*n*	Δ
1898.61	76.9	8.47	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

3427. **Σ 921.** (= **H N. 2** = **S 523.**) Fixed. 24 29

1866.99	4°.1	16″.18	3*n*	Δ
1889.13	2.8	16.16	4*n*	Giacomelli
1903.84	4.0	15.98	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**VII**)....En....Da^3....Δ (1118)....Δ (**I, II**).... Giacomelli (**II**)...β^6...]

3428. **H 2319.** "Triple; neat star." The only measures are by Espin (*Mon. Not.* LXII, 532): 24 55

AB	1900.51	305°.9	3″.58	2*n*	Es
AC	1900.51	259.4	15.81	2*n*	Es

3431. **OΣ 144** *rej.* From *Poulkowa Catalogue* of 1843. Companion invisible to Dembowski in 1866. In 1875 I saw it with difficulty with the 6-inch. The only measures are: 25 6

1898.10	155°.8	20″.72	3*n*	Doo	7 ...10
1899.34	155.3	20.88	3*n*	Hu	7.8...12.5

[Δ (**I**, p. 228)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...]

25^{m} 8^{s} **3432.** **H** 731. "A third 12 m 140° ±, and a fourth 12 m 220° ±."

25 16 **3434.** **Σ** 926. (= **Ḥ** III. 75 = **S** 522 = **H** 375.) No motion.

1866.13	287°.2	10″.64	3*n*	Δ
1893.18	287.2	10.39	2*n*	Gla
1901.88	293.8	10.46	1*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...Da²...Δ (**II**)...Glasenapp (**II**)...]

25 18 **3435.** 20 *Geminorum.* **Σ** 924. (= **Ḥ** IV. 28 = **Ḥ** IV. 46 = **Sh** 72.) Relatively fixed. (See No. 3424.)

1867.50	209°.8	19″.93	4*n*	Δ
1889.49	210.0	19.81	10*n*	Giacomelli
1903.24	210.4	19.94	3*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XII, XIII, XV**)...Ba (**II**)...En...Ra (**XXII**)...OΣ (**IX**)...WS...WS²...Gl...Je (2346)...Sp (**II**)...Δ (1118)...Δ (**I, II**)...Giacomelli (**II**)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...*Annals Toulouse Obsy.* **III**...Biesbroeck...]

25 27 **3436.** **H** 3866. Later observations are:

1877.12	135°.8	4″.20	2*n*	Cin	8.0...9.5

[Cin⁴...Cin⁵...] (See p. 1068)

25 27 **3437.** **OΣ** 145. Without change.

1868.10	340°.3	1″.83	3*n*	Δ
1898.86	341.3	1.77	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

25 30 **3438.** **H** 2320. The only observations since Herschel are:

1874.63	322°.0	9″.45	2*n*	Δ	8.2...10.7
1903.95	322.4	9.14	2*n*	β	8.6... 9.8

[Δ (**I**, p. 362)...β⁶...]

25 33 **3439.** **G. Anderson** 3. Discovered by George Anderson with the Washington 26-inch. Examined with the 18½-inch, and identified; the magnitudes from my estimates. This is one of the principal stars of a large cluster. Barnard finds a large diffused nebulosity surrounding the cluster. The only other measures are:

AB	1903.01	288°.0	3″.22	2*n*	β	7.5...13.2
AC	1903.96	320.6	6.56	1*n*	β	...13.0
AD	1903.30	289.2	12.52	3*n*	β	...12.3
AE	1903.01	197.2	13.15	2*n*	β	...12.2

[Hl (**I, II**)...β⁶...]

25 42 **3440.** **OΣ** 146 *rej.* The only other measures are:

1878.99	141°.2	32″.72	1*n*	β
1899.41	141.4	32.62	5*n*	Hu

[Δ (**I**)...β³...Hu (*Pub. L. O.* **V**)...]

25 45 **3442.** **Ḥ** II. 37. (= **Σ** 927 *rej.*) Noted as "double" in *A. G. Albany.* The only observation since 1781 is the following:

1903.01	81°.5	5″.09	2*n*	β⁶	9.4...9.8

3443. **OΣ** 147. The three principal stars form a nearly equilateral triangle. Ma (XI) measures only the distant stars. One of his angles, 180°.1 (1843.3) evidently refers to BC. In 1865 Dembowski could not see the close pair. With the 18½-inch it was fairly seen, but difficult. There is no change in the wide stars, and probably none in CD. The only later measures of the close pair are: 26^{m} 6^{s}

C and D

1879.98	116°.5	0″.55	2*n*	β
1899.96	114.2	0.53	3*n*	Hu

A and B

1882.12	73°.2	43″.76	1*n*	β
1899.50	73.8	43.16	4*n*	Hu

A and CD

1886.12	116°.9	46″.24	2*n*	Eng
1899.50	116.8	46.47	4*n*	Hu

[OΣ (**IX**) (**X**, p. 15)...Δ (**I**, p. 228)...β³...Engelhardt (2685) (**II**)...Ma (**XI**)...Renz (*Bul. Acad. St. Petersburg*, 1892)...Hu (*Pub. L. O.* **V**)...]

3446. **H** 2321. Probably fixed. 26 12

1877.12	305°.7	5″.90	2*n*	Cin	8.0...9.2
1896.01	310.8	5.42	1*n*	Scott	

[Cin⁴...Scott (*Brit. Ast. Ass'n* **VI**, 368)...]

3448. **A** 216. Discovered at the Lick Observatory. No other measures. 26 22

[A (3784) (*Bul. L. O.* No. 16)...]

3449. **Σ** 928. (= **S** 521.) No motion. 26 26

1869.17	134°.5	3″.41	4*n*	Δ
1889.17	133.9	3.55	4*n*	Giacomelli
1903.10	133.3	3.46	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIII**)...Wr...Se...Se²...Δ (1204)...Δ (**I, II**)...Bl (**V**)...Seagrave (*Sid. Mess.* **II**, 274)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

3450. **Σ** 922. Some change, which is probably due to a small proper motion in A. 26 33

A and B

1867.08	134°.8	10″.31	3*n*	Δ
1904.44	135.5	10.58	3*n*	β

A and C

1867.08	2°.5	25″.61	3*n*	Δ
1904.44	4.3	25.28	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...Bl (**V**)...Δ (**II**)...β⁶...]

3451. **Σ** 930 *rej.* Since Part I was in type, I have identified this as DM (8°) 1393, the place of which is: 26 43

R. A. 6^{h} 27^{m} 38^{s}
Decl. 8° 4′ 50″

The only measures are:

AB	1905.09	277°.1	26″.00	1*n*	β⁶	8.5...9.8
AC	1905.09	105.2	43.40	1*n*	β⁶	...9.5

26^{m} 46^{s} **3452.** β 98. Discovered with the 6-inch. Without change.

1898.14	142°.6	0″.88	3*n*	Doo

[β (II) ... β (*Mon. Not.* **XXXIII**, 437) ... Δ (I) ... Cin^{4} ... Cin^{5} ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

26 51 **3453.** ξ^{1} *Canis Majoris.* See 68. The later measures are:

AB	1900.85	143°.3	24″.06	3*n*	Cg
AC	1900.85	302.9	29.01	3*n*	Cg

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

26 54 **3455.** S 524. (= Ħ V. 112 = σ 233.) No measures in Ħ. Without change The principal star has a proper motion of 0″.080 in 240°.1 (*A. G. Berlin*).

1855.96	243°.1	53″.66	4*n*	OΣ	7.5...7.8
1886.17	243.7	53.63	2*n*	Eng	
1903.86	243.5	53.69	2*n*	β	6.7...6.8

The only measure of the more distant star is:

1903.86	149°.2	106″.30	2*n*	β	...8.7

[OΣ (X, p. 15) ... Englehardt (2785) (II) ... β^{6} ...]

26 57 **3456.** OΣ 148. Probably fixed.

1869.78	73°.3	2″.58	4*n*	Δ
1878.27	74.2	2.66	1*n*	OΣ
1898.31	2.5	2.81	3*n*	Hu

[Ma (**XI**) ... OΣ (**IX**) (X, p. 191) ... Δ (I) ... Hu (*Pub. L. O.* **V** ...]

27 10 **3457.** Σ 929. No apparent motion.

1868.97	25°.0	5″.89	4*n*	Δ
1901.88	24.7	6.21	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se^{2} ... Ra (**XXIII**) ... Δ (1204) ... Δ (I, II) ...]

27 31 **3460.** Σ 932. The principal star is also W^{2} VI. 763. Slow motion in angle, with but little change in distance.

1863.76	333°.4	2″.26	4*n*	Δ
1876.07	332.8	2.23	3*n*	Hl
1883.80	327.3	2.30	5*n*	En
1886.22	328.6	2.09	2*n*	Hl
1893.18	328.1	2.34	3*n*	Lewis
1903.09	326.6	2.07	3*n*	Bowyer

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... H^{1} ... Da^{3} ... Da^{4} ... Se ... Se^{3} ... Hd ... WS ... Gl ... OΣ (**IX**) (**X**, p. 157) ... Δ (1473) ... Δ (**II**) ... Do (2196, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Flm ... Pl ... Bru^{2} ... Sk ... En (2663) ... Lv^{1} ... Hl (*Wash. Obsns.* 1885, 1886) ... Hl (I, II) ... Jones (*A. J.* 312) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LX**, 498; **LXI**, 486; **LXIII**, 403; **LXIV**, 793) ... Big (*Bul. Ast.* **XII**, 299) ... *A. G. Leipzig*, p. 207 ... HΣ (**XII**) ... Maw (**IV**) ... Sk^{5} ... Biesbroeck ...]

27 32 **3462.** Σ 923 *rej.* An uncertainty of 20^{m} R. A., in *Catalogus Novus*; identified as here given. The only measures are

1903.87	145°.5	30″.32	2*n*	β	8.0...10.2

[β (*Mon. Not.* **XXXIV**, 372) ... β^{6} ...]

27 41 **3465.** Σ 925. No change since Struve.

1868.45	91°.1	3″.50	4*n*	Δ
1904.29	92.9	3.46	2*n*	β

[Ma (*F. S.* I) ... Δ (**II**) ... β (*Mon. Not.* **XXXIV**, 372) ... β^{6} ...]

3467. β 194. Discovered with the 6-inch. No indication of change. 28^{m} 4^{s}

1880.55	283°.6	0″.9±	3*n*	Sp
1883.90	285.7	1.17	7*n*	En
1901.08	275.6	1.14	4*n*	Doo
1903.23	284.2	0.93	3*n*	Biesbroeck

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Δ (I) ... Sp (**II**) ... En (2678) ... Doolittle (*A. J.* 547) ... Biesbroeck ...]

(See p. 1068)

3469. 14 *Monocerotis.* Σ 938. Very little, if any, change. 28 16
The principal star has a proper motion of 0″.016 in 288°.6 (Auwers).

1844.15	208°.5	10″.02	2*n*	Ma
1868.28	208.6	10.49	4*n*	Δ
1878.20	209.9	10.59	1*n*	β
1903.85	208.4	10.86	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Ma (304) ... Δ (**II**) ... β^{1} ... β^{6} ...]

3470. Σ 933. (= Ħ N. 60 = S 525.) Fixed. 28 20

1868.35	74°.7	25″.67	4*n*	Δ
1903.87	74.8	25.61	2*n*	β

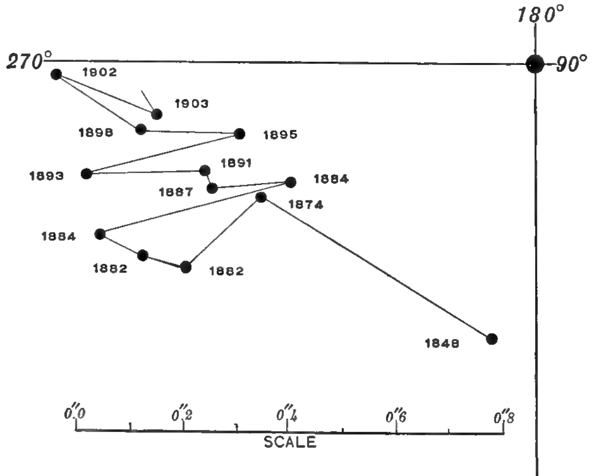
[Ma (*F. S.* **II**) ... Δ (**II**) ... Bl (**V**) ... β^{6} ...]

3472. A 217. No other measures. 28 41

[A (3784) (*Bul. L. O.* No. 16) ...]

3473. A. G. 116. Double in *A. G. Lund.* Measures by β^{6}. 28 45

3474. OΣ 149. Probably binary, but the angular motion is slow. Glasenapp, from the measures to 1884, finds a period of 85.9 years. It is evident from an inspection of the measures and the diagram that nothing can be inferred as to the form or extent of the apparent ellipse. The best measures are more or less contradictory, and the given positions are as 28 55



OΣ 149

well represented by rectilinear motion as any other. The system has a proper motion of 0″061 in 192°5 (Battermann).

1848.23	350°7	0″53	3*n*	OΣ
1868.33	316.6	....	3*n*	Δ
1874.23	296.2	0.58	1*n*	Δ
1882.12	300.7	0.77	3*n*	Hl
1882.21	296.5	0.83	2*n*	Sp
1884.00	292.0	0.89	5*n*	En
1884.18	296.5	0.52	2*n*	Per
1887.54	291.4	0.66	5*n*	Sp
1891.13	288.5	0.66	3*n*	Hl
1893.19	284.3	0.88	2*n*	Lewis
1895.24	283.6	0.58	7*n*	Com
1898.63	279.7	0.76	7*n*	Hu
1902.01	271.4	0.91	3*n*	Doo
1903.67	278.0	0.71	2*n*	Biesbroeck

[OΣ (**IX**)... Δ (**I**)...Flm......Per... Per (2684)...Sp (**II**)...Sp (**II**, App)...Sk^3 .... Glasenapp (2940).... Glasenapp (*Orbites, etc., Cat. Poulkowa*) .... En (2678)... Hl (*Wash. Obsns.* 1882)... Hl (**II**)... Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 386; **LXIV**, 793)...Maw (**I**)... Big (*Bul. Ast.* **XII**, 299)...Everett (*Mon Not.* **LVI**, 464)...Com (*Pub. Washburn Obsy.* **X**)...Hu (*A. J.* 427)(*Pub. L. O.* **V**)... A (3584)... HΣ (**XII**)... Sk^5...Doolittle (*A. J.* 547)...Biesbroeck...]

(See p. 1068)

$28^m\ 55^s$ **3475.** **Ho 234.** No other measures.

[Ho (2977)...] (See p. 1068)

28 56 **3477.** **Ho 235.** No other measures.

[Ho (2977)...] (See p. 1068)

28 58 **3479.** **Σ 935.** "Points to a third, 13 m," H (V). Fixed.

1866.83	324°4	3″43	3*n*	Δ
1897.99	322.8	3.38	2*n*	Hu
1903.17	324.0	3.40	1*n*	Do

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Δ (**II**)...Du... Sk^3...Big (*Bul. Ast.* **XII**, 299)... Collins (*A. J.* 378)... Ebell (3321)... Hu (*A. J.* 427) ... Knorre (3518, 3632)...Do (3930)...]

29 2 **3480.** **Σ 940.** H speaks of a rich orange 6-7 m star *p*. That is Rad^1. 1768 (5.7), 44^s *p*. Unchanged.

1867.00	294°1	9″98	3*n*	Δ
1903.94	294.2	10.28	3*n*	β

[H (**VI**)...Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

29 9 **3481.** **Σ 934.** Unchanged.

1867.65	330°4	4″19	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...]

29 17 **3483.** **Ho 341.** A 9 m star, 155°2 : 64″95 (1891.66). No other measures.

[Ho (3233)...] (See p. 1068)

3484. **Σ 936.** Change uncertain. $29^m\ 20^s$

1858.29	262°3	1″54	1*n*	Ma
1869.37	260.8	1.53	4*n*	Δ
1900.31	263.2	1.66	1*n*	Lewis

[Ma (*F. S.* **I**) ... Ma (**XIII, XV**) ... Δ (2194) ... Δ (**II**) ...Flm... Seagrave (*Sid. Mess.* **II**, 274)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486)...]

3485. **H 3871.** "A fine double star." Probably fixed. 29 28

1848.11	354°2	7″45	1*n*	J
1877.15	352.5	7.65	2*n*	Cin

[J^2...Cin^5...Scott (*Brit. Ast. Ass'n* **V**, 75)...Do (3798)...]

3487. **Σ 939.** Without change. 29 32

		A and B		
1867.60	105°6	30″16	3*n*	Δ
1893.16	106.2	30.11	2*n*	Gla
1902.73	105.4	30.30	1*n*	Hu
		A and C		
1867.60	50°0	39″74	3*n*	Δ
1893.16	50.1	39.14	2*n*	Gla
1902.73	50.3	39.70	1*n*	Hu
		B and C		
1868.94	2°9	33″68	2*n*	Δ
1902.73	2.7	33.53	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...En...Δ (**II**)...Glasenapp (**II**)...]

3488. **Σ 937** *rej.* No bright star in this place in the DM. The nearest, about 2^m *p*, is Σ 923 *rej.* 29 40:

3490. **Σ 941.** (= **H I. 84 = S 526.**) Very little, if any, change in the Struve stars. 30 11

1783.21	76°0	....	1*n*	H
1857.25	80.7	1″93	2*n*	Se
1868.81	78.7	1.78	4*n*	Δ
1881.22	81.1	2.09	4*n*	Je
1888.96	81.0	1.86	2*n*	T
1892.93	81.0	1.78	2*n*	Jones

Sh 367, in very nearly this place, is called "excessively unequal," and measured:

1822.14	133°0	28″06	1*n*	Sh

This seems to be a distant companion to Σ 941, but the distance is much greater. Possibly 28″ is a misprint for 82″. The only later observation is:

AC	1905.07	133°8	83″03	1*n*	β

C has a 13 m companion, 316° : 6″4.

[Ma (*F. S.* **I**)... Ma (**XI**) ... Da^1...Da^2...H^1...OΣ (**IX**)...Se...Se^2...Flm... Δ (1118)... Δ (**I, II**)... Do (2316)... Sk^3...T (2991)... Seagrave (*Sid. Mess.* **II**, 274)... Jones (*A. J.* 312)(*Proc. Haverford Coll. Obsy.* 1892) ... Je (2449) ...Big (*Bul. Ast.* **XII**, 299)...Giacomelli (**II**)...β^6...]

3492. **Σ 942.** No evidence of motion. 30 22

1868.42	244°5	3″31	3*n*	Δ
1902.24	245.2	3.69	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...Bp...Ba (**II**)...Hd...Da^3...Gl...WS^2... ...Δ (**II**)...]

30^m 22^s **3493.** **β 754.** Discovered with the 6-inch on Mt. Hamilton in 1879. Further measures are necessary to show whether or not there is any motion. There is a star 11 m, 40°: 25″. The principal star in Lacaille 5½ m, Gould 7.0. It is given a proper motion of 0″.118 in 312°.6.

1897.77	16°.2	0″.92	1*n*	See	6.2...7.5
1902.19	36.3	0.87	2*n*	Innes	

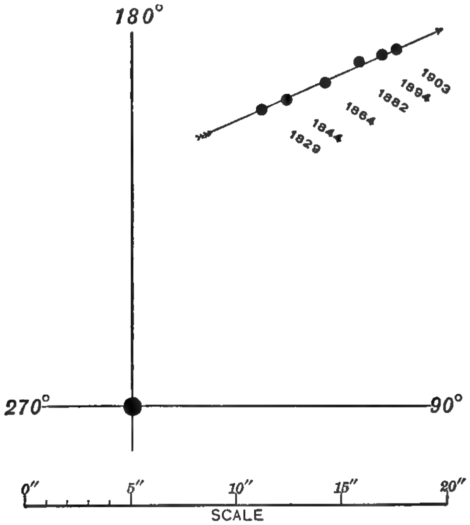
[β (**XI**)....β^2....β (3141)(*Pub. L. O.* **I, II**)....Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...See (3495)...Innes (*Mon. Not.* **LXIII**, 76; **LXIV**, 131)...]

30 33 **3495.** **Σ 943.** (= **S 527.**) Rectilinear motion.

1829.74	155°.9	15″.46	2*n*	Σ
1844.17	152.8	16.40	2*n*	Ma
1864.67	148.6	18.01	4*n*	Δ
1882.73	146.0	19.73	7*n*	En
1894.86	143.9	20.62	3*n*	HΣ
1903.98	143.2	21.28	2*n*	β

The 40-inch shows a nearer star, 13.5 m.

1903.99	284°.8	13″.81	1*n*	β^6



Σ 943

As the principal star appears from the measures to have a proper motion of about 0″.09 in 294°, it will make with the new star a moderately close pair hereafter.

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... Δ (1572)... Δ (**II**)... Flm... Sk^3... β^1... En (2663)... Do (2989)(*Trans. R. I. Acad.* **XIX**, Part 13)... Glasenapp (**II**)... Big (*Bul. Ast.* **XII**, 299)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^6...]

(See p. 1068)

30 42: **3496.** **H V. 71.** (= **H VI. 91** = **σ 236.**) No description. This is probably γ *Geminorum.*

30 49 **3497.** **OΣ 150.** In 1868 Dembowski thought there might be an elongation in 149°, but very uncertain. There is no satisfactory evidence of change.

1843.27	177°.3	0″.27	1*n*	Ma
1846.19	177.8	0.25	1*n*	Ma
1852.30	183.7	0.2	1*n*	Ma
1878.84	353.5	0.28	1*n*	β
1895.31	331.4	0.5±	1*n*	HΣ
1899.43	339.7	0.22	3*n*	Hu

[Ma (**XI, XIII**)....OΣ (**IX**)....Δ (**I**, p. 228)....β^3....Hu (*Pub. L. O.* **V**)....HΣ (**XII**)....]

3499. **S 529.** B and C are 885 and 886 of W^1. The principal star has some proper motion: 30^m 51^s

Porter	0″.289 in 194°.7
Bossert	0.309 in 193.7

The only measures since 1825 are:

AB	1901.82	154°.2	73″.98	2*n*	β^5	7.0...8.0
AC	1901.82	169.1	168.15	2*n*	β^5	...7.2

The change seems to correspond with the movement of A. B is a red star.

3502. **Arg. 15.** Marked "duplex, Cl. IV," in Arg. Examined and estimated as given (1876). 31 7

3503. *ν^1 Canis Majoris.* (= **H IV. 81** = **σ 237.**) But little, if any, change. The large star has a proper motion of 0″.043 in 301°.9 (Auwers). 31 8

1783.00	270°±	18″.32	1*n*	H
1859.98	262.9	16.79	2*n*	Wr
1877.15	262.4	17.50	2*n*	Cin
1893.93	264.2	17.01	1*n*	Scott

[H (**VIII**)...WJ...P^1...Ra (**XXIII**)...*Gr. Obsns.* 1842...Wr...Cin^4...Cin^6... Wilsoh (Cin^{10})...Scott (*Brit. Ast. Ass'n* **VI**, 248)...]

3504. *Argus* **34.** **β 755.** (AC = **H 3875.**) The duplicity of the principal star of H 3875 was discovered with the 6-inch at Mt. Hamilton in 1879. A naked-eye star in *Argo.* Lacaille 2359. The following are all the measures: 31 14

A and B

1887.24	253°.1	0″.77	2*n*	Pollock
1891.11	252.7	0.91	1*n*	Sellors
1897.17	260.6	1.09	1*n*	See

AB and C (= H 3875)

1887.25	301°.0	21″.22	1*n*	Pollock
1891.11	300.4	20.87	1*n*	Sellors
1897.17	301.8	21.83	1*n*	See

[β (**XI**)...β^2...Herschel (*Cape Obsns.*)...Russell (*Mon. Not.* **XLVII**, 473)... Pollock (*Mem. R. A. S.* **L**)(*Pub. Sydney Obsy.* 1891)...Sellors (3154)... See (3495)...]

3505. **Howe 13.** From Cin^3. Not examined, but this star probably is SD (15°) 1448, the place of which is R. A. 6^h 30^m 27^s; Decl. −16° 1′. 31 18:

3506. **Weisse 13.** "Duplex" in W^2. The magnitude of A in DM is 8.8. The only measures are: 31 19

1904.11	129°.2	111″.45	1*n*	β^6	8.5...10.8

$31^m\ 21^s$ **3507.** OΣ 151 *rej.* The only other measures are:

1843.24	139°9	29″81	2*n*	Ma
1898.26	135.3	29.32	3*n*	Doo
1898.66	135.5	29.48	3*n*	Hu

Doolittle measures a 13 m star from A:

1898.26	234°8	29″88	3*n*	Doo

[Ma (**XI**)...Δ (I)...Doolittle (*Pub. Flower Obsy.* I)...Hu (*Pub. L. O.* **V**)...]

31 29 **3508.** **S** 528. "Excessively difficult." The only observation since South is:

1904.41	26°5	81″70	2*n*	β^6	8.2...9.4

31 38 **3510.** **H** 3876. (= H II. 60.) "Triple, a third 13 m 25″ dist." Probably fixed. The 40-inch shows a 12 m star, 240°4 : 35″5, and a fainter star *f.*

1783.03	337°6	....	1*n*	H	
1878.16	336.3	8″84	2*n*	Cin⁵	
1903.88	336.9	9.11	2*n*	β	8.1...9.6

[Cin⁵...See (3495)...β^6...]

31 41 **3511.** **Hn** 80. No other measures.

[*Pub. Washburn Obsy.* **II**, **VI**...]

31 44 **3512.** **Σ** 944. Fixed.

1867.56	53°8	6″79	3*n*	Δ
1904.41	54.1	6.50	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Bl (**V**)...Δ (**II**)...β^6...]

31 55 **3515.** **Σ** 945. Apparently slow motion in angle, but Σ's value is probably too small.

1849.59	258°6	1″11	6*n*	OΣ
1865.38	257.4	0.94	3*n*	Δ
1872.55	257.4	0.90	2*n*	Δ
1872.87	265.2	0.84	3*n*	Du
1879.69	263.4	0.96	4*n*	Sp
1880.05	264.0	0.94	2*n*	Hl
1883.92	266.3	0.92	7*n*	En
1891.09	267.2	0.75	3*n*	Hl
1893.24	269.0	0.54	2*n*	Lewis
1897.99	267.8	0.81	2*n*	Hu
1904.11	269.7	0.82	2*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Se ... OΣ (**IX**) ... Du ... Δ (1110, 1735) ... Δ (**I, II**) ... Flm ... Sp (**II**) ... Hl (**I, II**) ... Sk³ ... En (2663) ... HΣ (**XII**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LX**, 489; **LXI**, 486; **LXII**, 383; **LXIV**, 793) ... Big (*Bul. Ast.* **XII**, 299) ... Hu (*A. J.* 427) ... Biesbroeck ...]

31 58 **3517.** **A. G.** 117. Double in *A. G. Lund.* Measures by β^6.

31 59 **3518.** 54 *Aurigae.* **OΣ** 152. There appears to be no sensible change, but the stars have a common proper motion of 0″041 in 232°9 (Auwers).

1869.83	36°9	0″83	5*n*	Δ
1882.21	37.1	0.96	3*n*	Sp
1884.04	36.5	0.85	4*n*	Per
1886.25	37.6	0.84	3*n*	Hl
1892.15	35.2	0.88	2*n*	Lv
1898.17	37.6	0.84	3*n*	Hu
1903.21	37.6	0.84	3*n*	Biesbroeck

[J³...Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Flm...Sp (**II**)...Per...Per (2684)...Hl (*Wash. Obsns.* 1886)....Hl (**II**)....Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...A (*Bul. L. O.* No. 11)...HΣ (**XII**)...Biesbroeck...]

$32^m\ 6^s$ **3519.** **H** 735. The place in H is exactly that of the 8.6 m star, DM (35°) 1462. This is a triple, and probably H saw only AC. My measures are:

AB	1904.08	228°5	5″05	3*n*	β	8.5...12.0
AC	1904.06	59.2	6.40	2*n*	β	...11.0

Lewis measured a pair in R. A. 6ʰ 33ᵐ, but Decl. and magnitudes not given, as follows:

1900.25	80°0	2″03	1*n*

I did not notice any other pair in this vicinity.

[β^6...Lewis (*Mon. Not.* **LXI**, 490)...]

32 35 **3521.** **HΣ.** Discovered by HΣ (XII, p. 128.) No other measures.

32 38 **3522.** **Howe** 14. Approximate place in Cin⁵. Identified as given, and measured:

1904.10	35°3	8″90	2*n*	β^6	8.7...10.6

32 48 **3523.** **Comstock.** Discovered by Comstock. From *Pub. Washburn Obsy.* VI.

32 52 **3524.** **A. G.** 118. Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554).

33 2 **3526.** **β** 571. Discovered with the 18½-inch. In Heis 6-7 m; DM 7.0. It is wanting in many of the star catalogues where a star of this brightness should be found.

1886.22	307°7	2″88	1*n*	HΣ	
1892.10	317.9	3.00	3*n*	β	
1899.08	322.4	2.49	2*n*	β	7.0...13.0

[β (**X**)...β^1...β (3141)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...HΣ (**XII**)...]

33 19 **3527.** **Σ** 947. Fixed.

1868.30	175°0	18″94	3*n*	Δ
1904.30	175.5	18.81	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

33 31 **3531.** **Hn** 81. Discovered by Holden. Measures by Comstock.

[*Pub. Washburn Obsy.* **II**, **VI**...]

33^{m} 47^{s} **3532. H 397.** In W^2 7 m in one observation, and 8-9 in another. This is the pair referred to by OΣ in the catalogue of 1850, in note to OΣ 152. The only measures are:

AB	1904.06	46°.1	30″.71	2*n*	β^6	7.8...13.0
AC	1878.88	56.8	55.72	1*n*	β^1	
	1904.06	58.0	56.10	2*n*	β^6	...11.7

33 49 **3533. Barnard 5.** Discovered by Barnard with the 40-inch. About 5′ distant, nearly following this is another faint pair, 316°.1 : 0″.77 : 12...12.2.

[Barnard (3561)...]

33 51 **3534. Σ 951.** The faint star was added by I. W. Ward with a 4.2 inch. No change in AB.

AB	1867.42	309°.5	21″.18	3*n*	Δ
	1904.02	309.7	21.21	2*n*	β
BC	1904.02	209.9	11.37	2*n*	β

[Δ (**II**)...Ward (*Ast. Reg.* **XVI**, 104)...β^1...β^6...]

33 51 **3535. O. Stone 14.** Approximate place in Cin^5. Identified and measured:

1903.93	228°.2	0″.75	2*n*	β^6	8.8...9.2

33 55 **3536. Ho 236.** Discovered at the Dearborn Observatory. No other measures.

[Ho (2977)...] (See p. 1068)

34 0 **3539. H 2331.** Herschel's C is now the nearest companion:

AB	1905.14	293°.3	27″.44	1*n*	β^6	8.0...12.5
AC	1905.14	50.5	24.81	1*n*	β^6	...12.0

34 15 **3541. Σ 946.** **(= S 530.)** Σ rated B 8.5 m in two observations, and 10.0 m in one, from which he suggested variability in the companion. S gives it 9 m; En, 6.5; and Δ 9.0. It is more probable that these differences are due to errors of the observers. The stars appear to be relatively fixed. The larger has a proper motion of 0″.065 in 315°.3 (*A. G. Hels*).

1869.22	131°.9	4″.11	4*n*	Δ
1904.07	129.7	4.34	2*n*	Es

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...Da^2...Ra (**XXII**)...Hd...En (1673)...Δ (**II**)...T (2898)...Bl (**V**)...Bryant (*Mon. Not.* **LX**, 499)...Espin (*Mon. Not.* **LXIV**, 676)...]

34 22 **3542.** 15 *Monocerotis.* **Σ 950.** **(= ♅ VI. 65.)** No measures in ♅; called "multiple." The fourth star, D, from Da^3. The star, E, was found to be double by Δ. (See No. 3543.) There is no change in C. The large star has no sensible proper motion, 0″.004 in 270° (Auwers).

There appears to be a very slow advance in the angle of the nearest companion.

A and B

1831.80	208°.6	2″.76	5*n*	Σ
1866.74	210.5	3.02	4*n*	Δ
1880.92	211.4	2.64	4*n*	Sp
1882.68	211.3	3.05	6*n*	En
1885.82	212.8	2.90	5*n*	Hl
1888.19	215.3	3.07	4*n*	T
1902.74	216.6	2.92	2*n*	Hu

A and C

1868.74	13°.9	16″.21	4*n*	Δ
1886.22	13.5	16.33	2*n*	Hl
1902.74	12.7	16.66	2*n*	Hu

A and E

1902.74	139°.5	73″.94	2*n*	Hu
1904.82	139.7	74.04	1*n*	β

[Ma (*F. S.* **I**, 49, 114)...Ma (**XI, XIII, XV**)...H (**VII**)...Se^1...Se^3...Da^3...Bp...Ba (**II, III**)...OΣ (**IX**)...Gl...WS...Do (2199)...(*Trans. R. I. Acad.* **XXIX**, Part 13)....Flm...Pl....Sp (**II**)....En (2663)....Sk^2....Hl (*Wash. Obsns.* 1885, 1886)...Hl (**I, II**)...T (2991, 3185)...Ra (**XXIII**)...Δ (**II**)...Do (3680)...*Annals Toulouse Obsy.* **III**...Biesbroeck...β^6...]

3543. Δ 11. Discovered by Dembowski in 1865. The principal star is E of 15 *Monocerotis* (Σ 950). No change. 34^{m} 26^{s}

AB	1904.83	46°.5	3″.76	2*n*	β
AC	1904.83	221.5	40.55	2*n*	β

[Ma (**XI**) called Σ 3118...Δ (1736)...Δ (**II**, p. 165)...β^6...]

3545. Σ 949. **(= H 2332.)** Fixed. 34 30

1869.76	288°.2	3″.36	5*n*	Δ
1894.04	289.9	3.42	1*n*	A. G.

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...*A. G. Leipzig*, p. 247...]

3546. Σ 954. **(= ♅ N. 103.)** Fixed. 34 34

1867.19	152°.2	12″.89	3*n*	Δ
1880.78	152.9	12.84	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...]

3547. Σ 952. Change in distance? 34 34

1869.55	115°.4	13″.73	4*n*	Δ	9.0...9.1
1902.07	115.0	14.15	2*n*	Hu	

A and 15 *Monocerotis*

1874.42	283°.3	178″.21	2*n*	Δ
1902.74	283.3	179.08	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

3548. Σ 953. No material change. 34 36

1867.78	329°.4	7″.18	4*n*	Δ
1889.17	327.8	7.02	5*n*	Giacomelli

[H^1...Ma (*F. S.* **I**)...Ma (**XI**)...Bp...Se...Se^3...Ra (**XXV**)...Ba (**II**)...Δ (1204)...Δ (**I, II**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

34^m 46^s **3549.** **Σ** 3117. Distance appeared to be less than 1″ (1875). The only measures are:

1863.22	87°.5	1″.01	5*n*	OΣ
1898.18	85.5	0.90	1*n*	Brown
1904.13	98.1	0.69	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...OΣ (**IX**)...Δ (1736)...Brown (3645)...Biesbroeck...]

34 48 **3550.** **OΣ** 153 *rej.* Excluded in *Poulkowa Catalogue* of 1850. Measures from Ma (XI). Distance probably in error. Very plain (1874) with 6-inch. Magnitudes from OΣ. In Lalande 8 m. The following are all the later measures:

1898.26	71°.1	20″.35	3*n*	Doo	7.0...10.0
1899.18	71.2	20.21	3*n*	Hu	7.0...12.0

[Ma (**XI**)...Δ (I, p. 228)...Doolittle (*Pub. Flower Obsy.* I)...Hu (*Pub. L. O.* **V**)...]

34 53 **3552.** **Σ** 3118. (= **H** III. 46?) H gives no measures. The place corresponds exactly, but too close for his Class II. It is more likely to be Σ 951 or Σ 953. The measures in Ma (XI), 46°.5 : 3″.84 (1844.03) 1*n*, evidently belong to No. 3543. This is given by Δ (1979) as new. The following are all the later measures.

1863.21	172°.9	2″.83	1*n*	OΣ
1873.28	169.7	2.71	3*n*	Δ
1894.14	170.7	2.63	2*n*	HΣ

[Ma (**XI**)...OΣ (**IX**)...Flm...Δ (1736, 1979)...Δ (**II**)...HΣ (**XII**)...]

34 56 **3554.** **A** 218. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

35 24 **3557.** **Σ** 955. (AC = **S** 532.) No change in C, and very little in the close pair. There is a faint star near C.

A and B				
1872.32	265°.9	0″.95	6*n*	Δ
1878.58	270.6	0.92	2*n*	β
1889.20	271.5	0.95	3*n*	Hl
1903.88	269.6	1.09	2*n*	β

AB and C				
1867.81	189°.0	11″.44	3*n*	Δ
1903.88	190.3	11.57	2*n*	β

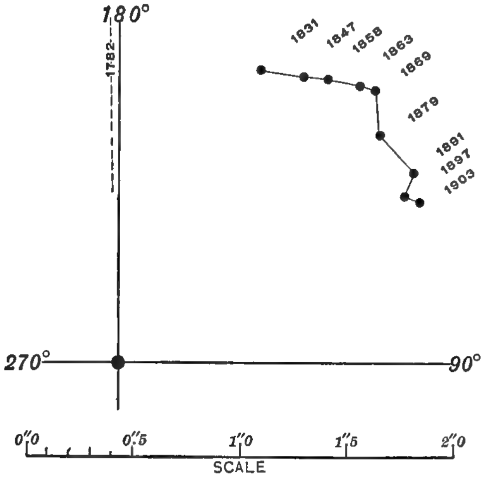
[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^1...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...
...Δ (**II**)...Hl (**I, II**)...β^1...β^3...Pt...Cin^5...LM...β^6...]

(See p. 1068)

35 38 **3559.** 12 *Lyncis.* **Σ** 948. (= **H** I. 6 = **Sh** 74.) There is no sensible change in the distant star. The physical relation of the components of the close pair is well established. The motion is retrograde, and very slow, the distance remaining sensibly constant. The measures by OΣ are nearly continuous for about forty years. Upon the assumption of uniform angular motion, which is as probable as any other so far as the measures are concerned, the period would be nearly 700 years. Gore (2802) from the measures to 1887 finds a period of 485.8 years, but it is evident that the orbit cannot be known, even approximately, for at least another century.

The system has a small proper motion:

Auwers	0″.085 in 275°.4
Bossert	0.084 in 276.8



12 Lyncis. Σ948

A and B				
1782.37	181°.4	....	1*n*	H
1831.10	153.7	1″.53	5*n*	Σ
1847.92	146.8	1.60	10*n*	OΣ
1858.32	143.3	1.66	3*n*	OΣ
1863.05	138.6	1.72	4*n*	Δ
1869.32	136.4	1.76	7*n*	OΣ
1879.30	130.9	1.63	3*n*	Hl
1891.06	122.5	1.65	3*n*	Hl
1897.89	120.0	1.56	4*n*	Hu
1903.11	118.0	1.60	2*n*	Bryant

A and C (= H III. 22)				
1847.92	305°.0	8″.58	10*n*	OΣ
1866.28	305.5	8.64	7*n*	Δ
1891.06	304.5	8.67	3*n*	Hl
1903.25	306.6	8.44	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H^1...H^2...Da^1...Da^2...*Gr. Obsns.* 1840...K...K (1519)...P^1...Se...Bp...En (1673, 2663)...Δ (1015, 1110, 1256, 1473)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Flm...Ra (**XXII, XXX**)...Ba (**II, IV**)...WS...Gl...Do (2196, 2199, 2316, 3680, 3798, 3799)...Nobile (*Rend. della R. Accad. Sci.*, Napoli, Nov. 1875)....Bru^2....Sk....Hd....Je (2449)...Bl (**V**)...T (2898)...OΣ (**IX**)...β^1...Hl (**I, II**)...*Proc. Haverford Coll. Obsy.* 1891, 1892....Do (*Trans. R. I. Acad.* **XIX**, Part 13)....OΣ (**X**, p. 157)...Gore (2802) orbit...Maw (**I, III**)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Hu (*A. J.* 427)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 499; **LXI**, 486; **LXIII**, 403; **LXIV**, 794)....Solá (3563)....Coleman (*Mem. R. A. S.* **LIII**)...Sk^5...Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)...Espin (*Mon. Not.* **LXIV**, 676)...Biesbroeck...]

3560. **Ho** 237. Description from Ho. I could not find any pair in or near this place with the 36-inch (1890.93) The magnitude of this star in DM is 7.3. 35^m 47^s

[Ho (2977)...β (3048) (*Pub. L. O.* **II**)...] (See p. 1068)

35m 49s **3561.** **H 2337.** "A third strongly suspected, *np*." No other companion seen with the 6-inch (1875). The 40-inch shows a third star, which may be the one suspected by Herschel, but it is much more difficult than any star of this class first observed by him.

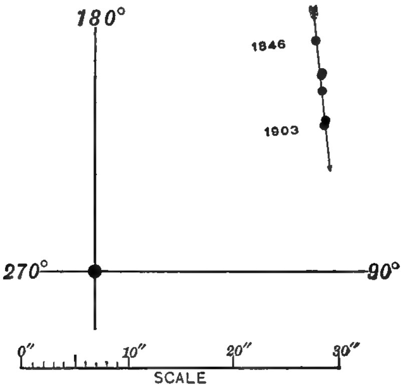
A and B

1904.89	345°4	1″80	2*n*	β6	8.5...11.5

A and C

1904.49	101°4	18″71	2*n*	β6	...11.0

35 53 **3562.** **OΣ 154.** The change is due to proper motion, which the measures give as 0″145 in 187°.



OΣ 154

1846.76	136°6	30″40	2*n*	OΣ
1869.28	131.4	28.77	2*n*	OΣ
1870.24	131.1	28.50	4*n*	Δ
1878.62	128.8	27.71	3*n*	β
1898.34	123.5	26.27	3*n*	Hu
1901.25	123.4	26.11	2*n*	β
1903.15	122.7	25.92	3*n*	Do

[Ma (**XI**)...OΣ (**IX**)(**X**, p. 191)... Δ (**I**)...β1...β3...Hl (**II**)...Hu (*Pub. L. O.* **V**)...Sk5...Doolittle (*A. J.* 547)...Do (3930)...β5...]

(See p. 1068)

35 58 **3563.** **A 510.** Not in DM, but 124″4 in 38°6 from the 9 m star, DM (28°) 1216.

[A (*Bul. L. O.* No. 50)...]

36 0: **3564.** **H 41.** Looked for, but so many small stars here, it was not identified with certainty (1876).

36 18: **3565.** **H III. 114.** Place uncertain in H; "a choice between two stars 9° 51′ and 9° 40′, or possibly a star between them." H thinks this may be the same as H III. 46. (See No. 3552).

36 27 **3567.** **Σ 956.** Perhaps change in distance of B.

A and B

1868.15	188°9	5″10	3*n*	Δ
1904.48	191.7	5.59	2*n*	β

A and C

1868.15	155°5	35″18	3*n*	Δ
1904.48	155.8	34.49	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β6...]

3568. *ε Geminorum.* **S 533.** (= **H VI. 73** = **σ 242.**) The large star has a proper motion of 0″025 in 258°4 (Auwers). The only measure since South is: 36m 33s

1901.30	94°0	110″45	2*n*	β5	...9.5

3569. **β 19.** Discovered with the 6-inch. Apparently fixed. 36 36

1874.14	169°4	4″07	1*n*	Kn
1877.12	164.5	3.66	2*n*	Cin
1888.12	166.6	3.70	3*n*	Lv
1888.86	167.0	3.65	2*n*	T
1898.16	165.2	3.92	1*n*	See

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Knott (*Mem. R. A. S.* **XLIII**)... Δ (**I**)...Cin4...Wilson (Cin10)...Lv1...T (2899, 2991)...See (   )...]

3575. 30 *Geminorum.* **Lamont 3.** First noted by Lamont. The large star has a proper motion of 0″07 in 180° (Bossert). These are all the later measures: 37 13

1879.06	184°1	28″05	3*n*	β
1898.12	185.4	26.71	3*n*	Doo
1904.71	184.1	27.16	2*n*	β

[Mu...Sadler (*Sid. Mess.* **V**, 218)...β3...Doolittle (*Pub. Flower Obsy.* **I**)...β6...]

3576. **A. G. 119.** Double in *A. G. Berlin.* Measures by Cogshall (*A. J.* 546). 37 20

3577. **A 219.** Discovered at the Lick Observatory. No other measures. 37 22

[A (3784) (*Bul. L. O.* No. 16)...]

3579. **β 195.** Discovered with the 6-inch. There is no material change. 37 26

A and B

1892.18	215°2	5″71	4*n*	Lv
1898.23	212.9	5.97	1*n*	See
1898.84	216.9	5.77	1*n*	β

A and C

1898.23	177°0	34″27	1*n*	See
1898.84	178.6	34.71	1*n*	β

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)(*Pub. Y. O.* **I**)...Cin4...Lv (*A. J.* 278)...(*Proc. Haverford Coll. Obsy.* 1892)...See (   )...]

3580. **Σ 957.** Probably without change. 37 27

1866.86	93°3	3″35	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

37^{m} 27^{s} **3581.** **H. C. Wilson** 4. Approximate place in Cin^{10}. Assumed to be the Cord. DM star given in Part I. No other measures.

37 43 **3582.** **S** 534. Marked "double" in *Wash. Mer. Cir. Zones.* 7 m in Lalande. No change.

1878.11	142°0	18″20	2*n*	Cin	7.0...8.0

[Cin^{4}... Cin^{5}... Scott (*Brit. Ast. Ass'n* **VI**, 368)...]

37 50 **3583.** **A** 122. No other measures.

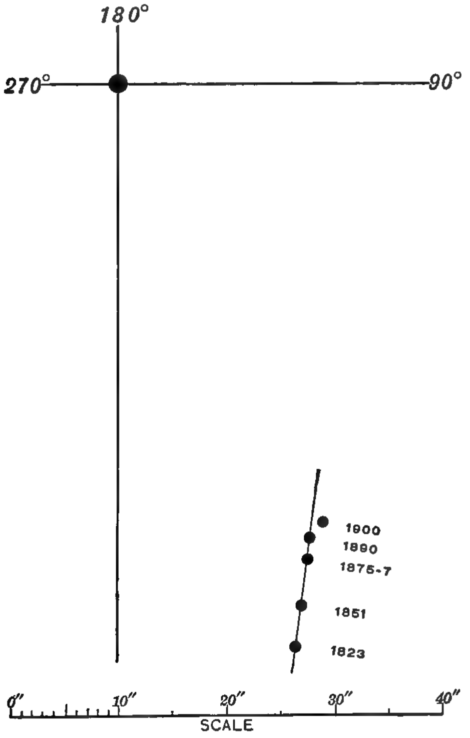
[A (3741) (*Bul. L. O.* No. 3)...]

38 2 **3584.** **OΣ** 155. The first distances seem to be too small, as there has been no change since Dembowski.

1843.24	260°0	13″61	2*n*	Ma
1867.86	260.4	15.35	3*n*	Δ
1878.13	259.7	15.07	2*n*	β
1898.26	260.0	15.52	3*n*	Doo
1899.02	260.8	15.39	3*n*	Hu

[Ma (**XI**)... OΣ (**IX**)... Δ (**I**)... Flm...β^{1}...Doolittle (*Pub. Flower Obsy.* **I**)... Hu (*Pub. L. O.* **V**)...Do (3930)...]

38 5 **3585.** 56 *Aurigae.* **Sh** 75. (= ♅ **V.** 107 = σ 244 = **OΣ (App)** 78.) There is certainly a large error in the distance of ♅ as given in H, but OΣ gives this 56″07. The change shown by the subsequent measures is due to the proper motion of A, 0″153 in 347°8 (Bossert).



56 Aurigae. Sh 75

1783.26	17°4	52″95	1*n*	♅
1823.20	17.1	55.38	1*n*	Sh
1851.95	19.0	51.91	2*n*	Σ
1875.88	21.4	48.23	6*n*	Δ
1877.28	21.2	48.35	10*n*	Hl
1890.18	22.3	46.44	3*n*	Hl
1900.34	24.6	45.39	4*n*	Es

[OΣ (**X**, p. 16)... Δ (**I**, pp. 248, 412)... Bl (**V**)... Hl (**I, II**)... Ra (**XXII**)... En (2662)... Schur (2723) parallax...T (2991)... Engelhardt (**II**)... Franz (3080) ...Schur (3243)...Espin (*Mon. Not.* **LXII**, 532)...]

3586. **Σ** 959. Fixed. 38^{m} 10^{s}

1868.41	175°0	11″67	3*n*	Δ
1904.71	175.2	11.82	2*n*	β

[H (**VI**)...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

3587. **Σ** 958. (= ♅ **II.** 72 = **S** 531.) Relatively fixed, but a common proper motion of 0″112 in 153°2 (Bossert). 38 11

1869.17	78°4	4″98	4*n*	Δ
1901.56	76.2	5.16	2*n*	Es

[Ma (*F. S.* **I**)... Ma (**XI, XV**)... Wr... Da^{2}... Se... Ra (**XXIII**)... Bl (**V**)... Δ (1118)... Δ (**I, II**)...*Annals Toulouse Obsy.* **III**... Espin (*Mon. Not.* **LXIV**, 676)...]

3589. **A. G.** 120. Noted as a 6″ pair in *A. G. Albany;* but Miller and Cogshall (*A. J.* 554) record it as "not double." 38 31

3591. **A. G.** 121. Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 39 16

3592. **A** 57. No other measures. 39 19

[A (3668) (*Pub. A. S. P.* **XII**, 128)...]

3593. **Ho** 238. Discovered at the Dearborn Observatory, and independently about the same time by HΣ at Poulkowa. The other measures are: 39 20

1887.22	186°9	0″65	1*n*	HΣ
1897.17	184.3	0.41	1*n*	Ho

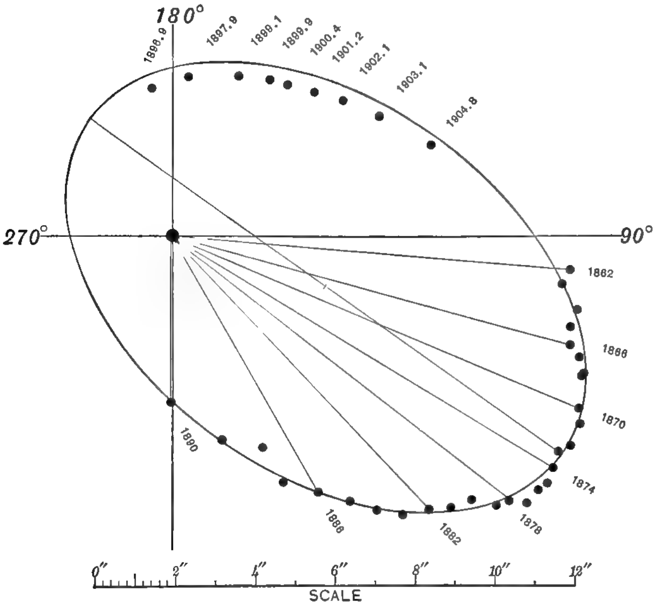
[Ho (2977, 3558)...HΣ (**XII**, p. 146)...] (See p. 1068)

3596. α *Canis Majoris.* **Sirius.** **A. G. Clark** 1. The history of this remarkable system is too well known to be given in detail here. The companion was discovered by Alvan G. Clark with the 18½-inch refractor which was subsequently acquired by the Dearborn Observatory. The existence of the small star was predicted by Bessel nearly twenty years previously from the variable proper motion of Sirius as shown by the meridian observations. In 1851 Peters calculated the theoretical orbit of the disturbing body which would satisfy the observed places of Sirius to that time, and, so far as appears, the period thus found is as nearly correct as that of any modern computer from visual observations of the real star during nearly forty years. 39 53

In the list of orbits computed for this star, the date given is that of the last measure used in the investigation.

ORBITS OF SIRIUS

(1851)	Peters	50.01	*A. N.* 745–48
1864	Auwers	49.42	*A. N.* 1506
1880	Mann	49.46	*Sid. Mess.* II, 136
1880	Colbert	49.6	*Dearborn Obsy. Rep.* 1885–86
1881	Plummer	50.	*Mon. Not.* XLII, 56
1887	Mann	51.22	*Sid. Mess.* VII, 25
1888	Gore	58.47	*Mon. Not.* XLIX, 420
1890	Auwers	49.40	*A. N.* 3084
1890	Howard	57.02	*A. J.* 235
1890	Howard	50.99	*A. and A.-P.* XIII, 430
1890	Burnham	51.97	*Pub. L. O.* II, 54, 239
1890	Roberts	51.10	*A. J.* 328
1890	See	52.20	*Evolution of the Stellar Systems*
1890	Zwiers	51.10	*A. N.* 3336
1896	Burnham	51.80	*Mon. Not.* LVII, 453
1896	Mann	50.12	*Pop. Ast.* IV, 482
1899	Zwiers	48.84	*A. N.* 3588
1903	Lohse	50.38	*A. N.* 3955
1903	Doberck	49.49	*A. N.* 3981



Orbit of Sirius

The apparent orbit found in my last investigation of this system (*Monthly Notices* LVII, 453), is reproduced here with the mean results of the best measures for each year since that time (1896) added. The errors in position are much less than the unavoidable errors of observation with the best telescopes. All the investigations that have been made are necessarily only provisional, and there can be no certain improvement until the companion is well in the first quadrant. The early distance measures are obviously somewhat uncertain for the first few years after the companion was discovered. When this material has been supplanted by modern micrometrical work, the elements of the orbit should be known with great exactness.

The proper motion of Sirius is given by Auwers as 1″313 in the direction of 204°05.

The following is a revised and corrected list of all the measures:

MEASURES OF SIRIUS

		1862		
1862.19	84°6	10″07	6*n*	Bond
1862.20	85.0	10.09	5*n*	Rutherfurd
1862.23	84.5	10.42	2*n*	Chacornac
1862.28	83.8	(4.92)	1*n*	Lassell
		1863		
1863.15	88°4	7″63	1*n*	Secchi
1863.21	83.8	10.15	2*n*	Otto Struve
1863.21	81.3	9.54	6*n*	Rutherfurd
1863.23	84.9	10±	1*n*	Dawes
1863.27	82.8	....	1*n*	Bond
		1864		
1864.14	79°4	10″60	3*n*	Marth
1864.18	80.1	9.64	1*n*	Lassell
1864.22	78.6	10.70	2*n*	Bond
1864.22	78.1	10.89	3*n*	Otto Struve
1864.23	84.9	10±	1*n*	Dawes
1864.23	78.7	10.05	1*n*	Winnecke
		1865		
1865.10	78°9	....	3*n*	Lassell and Marth
1865.20	78.4	10″64	2*n*	Otto Struve
1865.22	75.5	9.59	8*n*	Secchi
1865.23	77.8	10.77	4*n*	Foerster
1865.25	76.9	....	3*n*	Tietjen
1865.26	76.9	9.0	1*n*	Engelmann
		1866		
1866.07	77°2	10″43	1*n*	Knott
1866.21	....	10.74	1*n*	Bruhns
1866.20	76.9	10.94	3*n*	Otto Struve
1866.20	73.9	10.97	1*n*	Tietjen
1866.20	74.1	11.29	1*n*	Foerster
1866.23	74.0	10.17	2*n*	Hall
1866.23	74.9	10.57	3*n*	Newcomb
1866.25	78.6	10.34	1*n*	Tuttle
1866.26	75.1	10.36	2*n*	Eastman
1866.29	71.3	10.11	3*n*	Secchi
		1867		
1867.10	73°8	10″66	5*n*	Searle
1867.19	72.5	11.15	6*n*	Winlock
1867.24	73.3	10.93	1*n*	Otto Struve
1867.24	72.3	....	2*n*	Foerster
1867.24	73.1	....	1*n*	Fuss
1867.27	74.9	9.92	1*n*	Eastman
		1868		
1868.01	73°2	10″25	2*n*	Searle
1868.04	72.1	....	1*n*	Peirce
1868.20	70.1	11.48	1*n*	Otto Struve
1868.21	70.3	11.29	1*n*	Foerster
1868.22	69.3	10.63	5*n*	Auwers
1868.23	70.3	11.25	7*n*	Vogel
1868.24	69.6	11.35	5*n*	Bruhns
1868.26	71.7	10.95	5*n*	Engelmann

1869

1869.10	74°7	10″26	4*n*	Brünnow
1869.15	73.6	11.23	3*n*	Vogel
1869.20	68.6	11.26	1*n*	Dunér
1869.20	68.6	11.07	2*n*	Winlock
1869.23	70.8	10.93	1*n*	Peirce
1869.23	68.9	10.97	3*n*	Otto Struve

1870

1870.13	67°9	11″16	4*n*	Peirce
1870.17	65.9	11.06	5*n*	Winlock
1870.22	66.5	11.32	4*n*	Otto Struve
1870.24	65.1	12.06	5*n*	Vogel

1871

1871.16	65°9	10″75	3*n*	Secchi
1871.20	70.3	11.19	1*n*	Peirce
1871.23	64.0	11.21	2*n*	Dunér
1871.24	64.0	11.82	1*n*	Otto Struve
1871.25	60.1	12.1	3*n*	Pechüle

1872

1872.10	63°4	11″51	5*n*	Peirce
1872.18	59.8	11.14	2*n*	Dunér
1872.21	67.1	10.75	3*n*	Börgen
1872.22	63.6	11.95	2*n*	Otto Struve
1872.24	62.4	11.50	1*n*	Newcomb
1872.24	64.3	11.46	5*n*	Hall
1872.26	61.3	....	3*n*	Skinner

1873

1873.20	65°8	11″12	1*n*	Hall
1873.22	60.5	11.26	3*n*	Otto Struve
1873.22	60.9	10.65	1*n*	Dunér
1873.23	70.0	9.80	1*n*	Börgen
1873.23	66.3	10.42	1*n*	Bruhns

1874

1873.93	65°0	11″29	1*n*	Wilson & Seabroke
1874.15	59.2	11.59	8*n*	Newcomb
1874.19	58.7	11.99	1*n*	Holden
1874.22	60.9	11.69	1*n*	Otto Struve
1874.23	58.0	11.10	2*n*	Hall

1875

1874.83	57°5	....	1*n*	Burton
1875.19	57.1	10″81	4*n*	Dunér
1875.21	56.7	11.42	2*n*	Newcomb
1875.21	55.9	11.89	4*n*	Holden
1875.23	57.8	10.50	1*n*	Otto Struve

1876

1876.03	57°8	11″12	1*n*	Watson
1876.05	54.6	11.45	1*n*	Peters
1876.09	54.9	11.82	6*n*	Holden
1876.14	55.0	11.55	4*n*	Russell
1876.22	55.2	11.19	6*n*	Hall
1876.23	58.3	11.35	1*n*	Otto Struve

1877

1877.10	53°6	11″30	1*n*	Howe
1877.11	52.6	11.15	2*n*	Upton
1877.16	52.8	11.35	4*n*	Holden
1877.23	55.9	10.91	2*n*	Otto Struve
1877.26	53.4	10.95	5*n*	Hall

1878

1877.97	52°4	10″87	8*n*	Burnham
1878.07	50.5	11.07	4*n*	Holden
1878.14	51.2	10.84	2*n*	Howe
1878.17	51.0	10.58	2*n*	Stone
1878.19	54.4	11.24	5*n*	Pritchett
1878.22	53.2	11.4	3*n*	Eastman
1878.22	48.6	10.37	2*n*	Otto Struve
1878.24	51.7	10.76	5*n*	Hall

1879

1879.05	50°7	10″44	10*n*	Burnham
1879.10	47.8	11.25	6*n*	Holden
1879.16	48.8	10.54	2*n*	Stone
1879.15	50.3	10.78	5*n*	Pritchett
1879.17	49.8	10.32	2*n*	Howe
1879.20	50.1	10.55	6*n*	Hall
1879.22	46.2	11.05	3*n*	Otto Struve

1880

1879.75	46°5	10″29	1*n*	Stone
1880.00	48.8	10.55	1*n*	Russell
1880.04	50.2	10.4	1*n*	Gledhill
1880.10	47.1	10.48	4*n*	Holden
1880.11	48.3	10.00	10*n*	Burnham
1880.17	49.6	9.87	3*n*	Hough
1880.17	47.6	10.37	2*n*	Pritchett
1880.18	46.7	9.92	4*n*	Bigourdan
1880.22	51.1	....	1*n*	Smith
1880.25	47.8	10.30	8*n*	Hall
1880.28	48.6	10.38	2*n*	Frisby

1881

1881.07	46°3	9″77	8*n*	Burnham
1881.12	43.3	10.83	2*n*	Holden
1881.14	44.3	10.02	3*n*	Bigourdan
1881.16	46.8	9.8	4*n*	Gledhill
1881.16	45.6	....	1*n*	McNeill
1881.17	46.9	10.11	6*n*	Frisby
1881.17	44.3	9.94	2*n*	Pritchett
1881.18	46.7	9.79	6*n*	Young
1881.26	45.3	9.60	5*n*	Hough
1881.26	45.3	10.00	6*n*	Hall

1882

1881.99	43°6	9″38	11*n*	Burnham
1881.99	41.6	9.51	2*n*	Stone
1882.11	41.2	9.68	1*n*	Wilson
1882.12	43.0	9.49	1*n*	Pritchett
1882.13	43.1	9.30	9*n*	Hough
1882.13	42.4	9.76	3*n*	Bigourdan
1882.18	42.2	9.95	6*n*	Frisby
1882.20	46.1	....	4*n*	Engelmann
1882.23	42.5	9.67	7*n*	Hall

1883

1883.10	40°1	9″05	10*n*	Burnham
1883.10	39.0	9.41	1*n*	Young
1883.12	39.7	9.02	11*n*	Hough
1883.14	41.3	....	1*n*	Wilson
1883.17	41.4	9.75	7*n*	Frisby
1883.19	39.9	9.10	1*n*	Bigourdan
1883.21	39.7	....	2*n*	Englemann
1883.21	39.1	9.26	6*n*	Hall

		1884		
1884.05	36°0	9″67	6*n*	Perrotin
1884.11	36.0	8.59	2*n*	Wilson
1884.17	35.3	8.79	1*n*	Bigourdan
1884.18	36.7	8.51	11*n*	Hough
1884.19	36.4	8.39	10*n*	Burnham
1884.22	38.2	8.00	1*n*	Otto Struve
1884.23	37.7	8.81	8*n*	Hall
1884.27	36.3	8.70	4*n*	Young
		1885		
1884.93	....	8″01	1*n*	McNeill
1885.11	34°1	8.09	8*n*	Young
1885.15	31.5	7.74	1*n*	Wilson
1885.20	32.7	7.96	10*n*	Hough
		1886		
1886.04	33°4	....	1*n*	Leavenworth
1886.05	29.8	7″59	3*n*	Young
1886.14	28.7	7.21	12*n*	Hough
1886.15	28.7	6.80	2*n*	Wilson
1886.21	39.6	7.89	1*n*	Otto Struve
		1887		
1887.14	25°4	7″08	4*n*	Young
1887.19	23.7	6.78	7*n*	Hough
1887.23	24.2	6.51	4*n*	Hall
		1888		
1888.24	23°3	5″78	3*n*	Hall
		1889		
1888.97	13°9	5″27	5*n*	Burnham
		1890		
1890.27	359°7	4″19	3*n*	Burnham
		1897		
1896.85	189°2	3″73	4*n*	Schaeberle
1897.03	186.9	3.80	5*n*	Aitken
1897.21	186.6	3.78	1*n*	Hussey
		1898		
1897.80	173°9	4″63	4*n*	See
1897.83	173.7	4.95	2*n*	Boothroyd
1897.84	175.2	3.95	3*n*	Schaeberle
1897.94	175.0	4.01	2*n*	Hussey
1897.95	173.1	4.11	5*n*	Aitken
1898.21	179.2	4.68	1*n*	Lewis
		1899		
1899.06	157°3	4″37	3*n*	Aitken
1899.09	157.6	4.31	5*n*	Hussey
1899.51	161.7	4.78	1*n*	Brown
		1900		
1899.85	150°3	4″76	3*n*	Barnard
1899.90	145.6	4.53	4*n*	Aitken
1900.29	150.9	4.64	4*n*	See
1900.41	142.8	4.75	3*n*	Hussey
		1901		
1901.25	135°0	5″13	3*n*	Aitken
		1902		
1902.01	129°4	5″60	2*n*	Barnard
1902.18	127.1	5.46	6*n*	Hussey
		1903		
1903.03	120°4	5″87	3*n*	Aitken
1903.09	119.8	6.08	4*n*	Barnard
1903.12	127.8	6.31	1*n*	Doolittle
1903.16	120.0	5.97	2*n*	Hussey
		1904		
1904.18	121°2	6″5±	1*n*	Biesbroeck
1904.80	109.1	6.92	1*n*	Hussey
1904.90	109.6	6.76	2*n*	Aitken

A number of faint stars in the field with Sirius have been measured from time to time by various observers, but they are all fixed in space, and of no particular interest. The relative change is due to the proper motion of the large star.

(See p. 1068)

References to Measures, Etc., of Sirius

Abbe	*Mon. Not.* **XXVIII**, 2...
Aitken	*A. J.* 388, 415, 429...*A. N.* 3389, 3465, 3584, 3638...*Bul. L. O.* No. 11...*Pub. A. S. P.* **IX**, 238; **XI**, 128; **XII**, 31...
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Barnard	*A. J.* 420, 477, 479, 541...
Bond	*Am. Jour. Sci.* 2d Series, **XXXIII**, 286...*Mon. Not.* **XXII**, 170... *A. N.* 1353, 1374 (see Harvard)...
Bessel	*Mon. Not.* **VI**, 136...
Bigourdan	*Observations de Paris*, 1883...
Biesbroeck	*Annales astronomiques de l'Observatoire Royal de Belgique* **IX**, nouvelle série, 1904...
Bouris	*Ergänzungsheft zu den Ast. Nach*, p. 121...
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Gore	*Mon. Not.* **XLIX**, 420...Catalogue of binary stars, *Proc. Royal Irish Acad.* 1891...*Observatory* **XXVIII**, 55...
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Howard	*A. J.* 235...*Ast. and A.-P.* **XIII**, 430...

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HUSSEY	*A. J.* 397, 427...*A. N.* 3585...*Bul. L. O.* No 44.. *Pub. A. S. P.* **XI**, 163...
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LANGIER	*A. N.* 1142...
LASSELL	*Mem. R. A. S.* **XXXVI**, 38 ... *Mon. Not.* **XXIV**, 145 ... *A. N.* 1360...
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LOHSE	*A. N.* 3955...
LEAVENWORTH	*Publications of the McCormick Observatory* I, Part 4...
MADLER	*A. N.* 304...
MAIN	*Mon. Not.* **XX**, 202..
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SECCHI	Serie Seconda delle Misure Micrometriche fatte all' Equatoriale di Merz del Collegio Romano 1863–66 ... Terza Serie delle Misure Micrometriche fatte all' Equatoriale di Merz del Collegio Romano 1872–74...
STRUVE, O.	*Mon. Not.* **XXIV**, 149; **XXVI**, 268...OΣ (**X**)...*Mélanges Mathématiques et Astronomiques* **III**, 558 (measures by Winnecke)...
TEMPEL	*A. N.* 1472, 2166...
VOGEL	*A. N.* 1696, 1767, 1804...
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WILSON	*Mem. R. A. S.* **XLII**...*Mon. Not.* **XXXIV**, 484...
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YOUNG	*Sid. Mess.* **V**, 182...*Observatory*, **IV**, 184; **X**, 263...
ZWIERS	*A. N.* 3336, 3400, 3588...*Royal Acad. Amsterdam* **II**...
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40^m :5 **3597. Hd 86.** "Declination same as Hd 82," but that star is 1° further south.

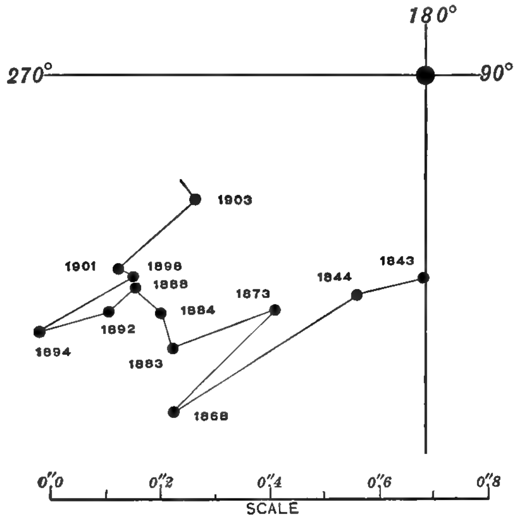
40 1 **3600. Σ 960.** Fixed. The principal star is given a proper motion of 0″041 in 227°5 (*A. G. Harvard*).

1867.77	66°7	21″88	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (**V**)...Δ (**II**)...]

40 23 **3601. OΣ 156.** Probably binary, but the measures are inconsistent.

1843.22	359°1	0″37	1*n*	Ma
1844.99	342.5	0.42	4*n*	OΣ
1868.99	323.0	0.77	4*n*	Δ
1873.25	327.2	0.51	1*n*	OΣ
1883.04	317.1	0.68	7*n*	En
1884.04	310.6	0.65	4*n*	Per
1888.18	306.2	0.66	2*n*	Hl
1892.06	306.2	0.73	3*n*	HΣ
1894.18	303°4	0″85	2*n*	Big
1898.24	304.4	0.65	6*n*	Hu
1901.11	301.9	0.67	3*n*	Bryant
1903.11	298.0	0.48	3*n*	Bowyer



OΣ 156

[Ma (**XI**)....OΣ (**IX**)....Δ (**I**)....Flm....Do (2330)....En (2678)....Per...Per (2684)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Sp (**III**)...Big (*Bul. Ast.* **XII**, 299).... Brown (3645).... Doolittle (*Pub. Flower Obsy.* **I**).... HΣ (**XII**).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 498; **LXI**, 486; **LXII**, 383; **LXIV**, 794)...Hu (*Pub. L. O.* **V**)(*A. J.* 427)...]

3602. Σ 967 *rej.* Measures from the introduction to *Mensurae Micrometricae.* Nothing since except the following: 40^m 25^s

1900.77	190°8	13″29	2*n*	β^5	8.2...10.5

3603. Ho 516. (= **Innes 179.**) Very similar to H 3891 (No. 3608). 40 27

1901.13	226°7	4″49	1*n*	Innes

[Ho (3557)...See (3495)...Innes (3438) (*Mon. Not.* **LXII**, 474)...]

(See p. 1068)

3604. Σ 965. The small star was added with the 18½-inch. There appears to be some change in the distant Σ companion. D is W^1 VI. 1190. 40 36

A and B

1868.08	348°5	5″71	3*n*	Δ
1879.16	348.5	5.85	2*n*	β
1894.03	349.5	5.86	1*n*	Leip

A and C

1905.07	321°3	16″10	2*n*	β

A and D

1868.08	68°1	46″02	3*n*	Δ
1879.16	67.1	45.28	2*n*	β
1905.07	65.1	44.74	2*n*	β

The 40-inch shows a faint star nearer than C:

1905.07	35°9	11″03	1*n*	β	...13

[Ma (*F. S.* **I**)... Ma (**XI**)...Δ (**II**)...*A. G. Leipzig*, p. 207...$\beta 3$...$\beta 6$...]

40m 42s **3606.** **Σ 962.** (= **H 398.**) H reverses angle, but this is probably an error, as Δ gives, 8.0...8.4. No change.

1868.69	241°4	25″76	4*n*	Δ

[Δ (**II**)...]

40 55 **3607.** **H II. 71.** (= **Σ 961** *rej.*) Examined with the 6-inch (1876), and estimated distance of AB 10″; magnitudes, 8...10; and angle of CD 90°; magnitudes, 9.5...9.5. In a cluster of small stars. The principal star is probably DM (41°) 1532, and if so, the place should be R. A. 6h 41m 33s; Decl. +41° 8′.

AB	1900.14	48°6	8″04	1*n*	Espin	9.2...10.5
	1904.34	48.6	7.40	2*n*	Miller	8.4... 9.7
AC	1904.34	209.9	46.12	2*n*	Miller	... 9.7
CD	1903.34	287.5	7.72	2*n*	Miller	...10.2

[Espin (*Mon. Not.* **LXIV**, 679)...]

40 57 **3608.** **H 3891.** Some confusion in the measures of this and No. 3603, which is a very similar pair.

1876.14	220°2	5″43	2*n*	Cin
1897.77	203.7	5.49	1*n*	See
1901.05	224.0	4.59	1*n*	Innes
1902.07	221.4	4.66	5*n*	Do

[J^2...Se^1... Se^3...Cin^3... See (3495)... Innes (*Mon. Not.* **LXI**, 585; **LXII**, 474) ...Do (3798, 3799)...Tebbutt (*Mon. Not.* **LXII**, 486; **LXIV**, 59)...]

41 **3609.** **O. Stone 15.** From Cin^3. Several pairs near here. all with uncertain places (see Nos. 3598, 3599, 3610, 3617). Innes identifies this as O. Arg. S. 5667.

41 7 **3611.** **β 756.** This 8 or 8½ m star was suspected with the 6-inch on Mt. Hamilton in 1879 to be a very close pair. I could find no double in or near this place with the 36-inch, 1890.78.

[β (**XI**)...β^2...β (3048) (*Pub. L. O.* **I, II**)...]

41 20: **3614.** **Howe 15.** From Cin^3. Approximate place.

41 38 **3615.** **OΣ 157.** Some change in the position-angle.

1868.14	354°6	0″5±	3*n*	Δ
1870.22	357.2	0.73	1*n*	OΣ
1872.86	350.0	0.5±	4*n*	Δ
1879.10	357.2	0.64	1*n*	β
1892.56	342.0	0.59	2*n*	HΣ
1898.81	340.0	0.66	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...Do (2322)...β^3...HΣ (**XII**)...Sp (**III**)... Hu (*Pub. L. O.* **V**)...]

41 42 **3616.** **Σ 964.** Probably unchanged.

1869.32	195°0	1″72	4*n*	Δ
1897.29	189.5	1.36	3*n*	Coleman

[Ma (*F. S.* **I**)... Ma (**XI**)... Da^3...Δ (**II**)... Coleman (*Mem. R. A. S.* **LIV**)...]

41m 50:s **3617.** **Howe 16.** From Cin^3· place approximate. (See p. 1068)

41 51 **3618.** **Σ 966.** Fixed.

1868.62	111°3	5″39	4*n*	Δ
1878.04	111.7	5.35	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...WS...β1...]

42 12 **3622.** **Σ 970.** Fixed.

1868.97	128°1	20″11	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...En...Δ (**II**)...]

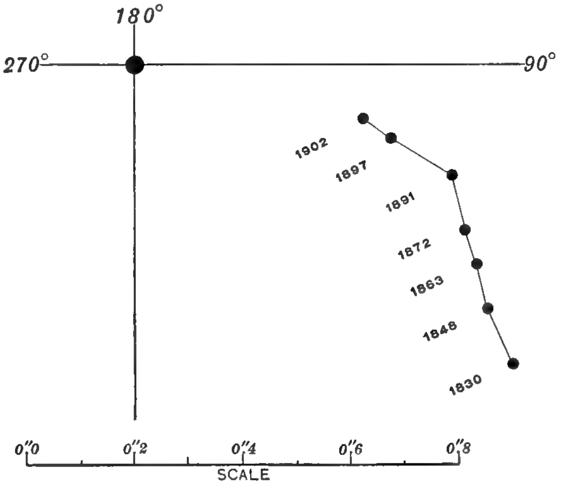
42 19 **3623.** **A. G. 122.** Measures from *A. G. Leipzig*, p. 247.

42 19 **3624.** **Σ 969.** Very little, if any, motion.

1869.03	316°8	7″09	4*n*	Δ
1878.10	317.1	7.19	3*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...]

42 30 **3625.** 14 *Lyncis.* **Σ 963.** Binary. Slow direct motion. The proper motion is 0″047 in 220°9 (*A. G. Hels.*).



14 Lyncis. Σ 963

1830.88	51°5	0″90	7*n*	Σ
1848.24	55.2	0.80	14*n*	OΣ
1863.44	59.5	0.74	6*n*	Δ
1872.79	63.2	0.69	3*n*	Δ
1891.16	70.7	0.63	1*n*	Big
1897.89	74.1	0.50	3*n*	Hu
1902.29	76.7	0.44	1*n*	Bryant

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)... H^1...OΣ (**IX**)... Δ (**II**)... En (1673)... Se... Se^3...Se (*Comp. Rend.* **XLVIII**, 375)...WS...WS^2...Hd...Δ (1474)...Sk... Flm...Do (2307)...Bl (**V**)...T (2898)...Holmes (*Brit. Ast. Ass'n* **V**, 78)... Big...Big (*Bul. Ast.* **XII**, 299)...Hu (*A. J.* 427)... Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LXIII**, 403)...Brown (3645)...HΣ (**XII**)...Sk^5...]

$42^m\ 39^s$ **3626.** **A** 58. **Lalande** 13126. It is remarkable that a pair of this class should have remained so long undetected.

[A (3668) (*Pub. A. S. P.* **XII**, 128) . . .]

42 50 **3628.** **Σ** 971. Probably unchanged.

1867.47	329°0	1″60	3*n*	Δ
1884.09	328.5	1.68	1*n*	Wilson

[Ma (*F. S.* **I**, 25, 49) . . . Ma (**XIII**) . . Δ (**II**) . . . LM . . . Cin^{6} . . . Wilson (Cin^{10}) . . .]

43 8 **3630.** **Ho** 239. No other measures.

[Ho (2977) . . .]

(See p. 1068)

43 17 **3633.** **Σ** 968. Fixed. The principal star is given a proper motion of 0″144 in 206°0 (*A. G. Harvard*). If this is correct the stars are moving together.

1867.01	288°4	20″75	3*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**V**) . . . Δ (**II**) . . .]

43 25 **3635.** **β** 20. The middle of three stars *nf Sirius*; discovered with the 6-inch. The measures do not show any motion.

1880.11	34°6	2″99	4*n*	β	
1888.54	34.5	3.12	3*n*	Lv	8.0 . . . 10.6
1899.09	32.7	3.12	1*n*	β	8.0 . . . 10.0

[β (**I**) . . . β (*Mon. Not.* **XXXIII**, 351) (*Pub. Y. O.* **I**) . . . Δ (**I**) . . . β^{3} . . . Cin^{5} . . . Lv^{1} . . . LM . . . Wilson (Cin^{10}) . . .]

43 32 **3636.** **A. Clark** 4. *Canis Majoris* 89. This is a naked-eye star in Arg. and Heis. Discovered by Alvan Clark in 1852. No evidence of change. Lalande 13173.

1877.61	291°4	0″91	2*n*	Cin	
1877.70	286.4	1.06	2*n*	Δ	6.0 . . . 8.7
1878.61	292.1	1.02	2*n*	β	
1888.23	290.6	0.99	3*n*	T	

[Da (*Mon. Not.* **XVII**, 257) . . . J^{3} . . . Hd . . . Cin^{4} . . . Cin^{5} . . . β^{1} . . . β^{3} . . . T (2991) . . . Δ (**I**) . . .]

44 0 **3641.** **OΣ** 158 *rej.* Rejected in *Poulkowa Catalogue* of 1850. Dembowski, from Ma (XIII) 131°7 : 17″50 (1846.3) 1*n*, thought change probable. Ma (XI) merely notes the companion as *nf*, and Ma (XIII) "companion invisible" 1852.3. The only other measures show that the companion is fixed. The principal star is given a proper motion of 0″009 in 270° (*A. G. Harvard*).

1878.91	304°8	16″34	1*n*	β
1898.32	304.0	16.62	3*n*	Hu

[Ma (**XI**, **XIII**) . . . Δ (**I**) . . . β^{3} . . . Hu (*Pub. L. O.* **V**) . . . Espin (*Mon. Not.* **LXIV**, 677) . . .]

44 5 **3642.** **Hu** 615. Discovered at the Lick Observatory.

[Hu (*Bul. L. O.* **No.** 57) . . .]

3646. **Σ** 976. Fixed. Struve mentions a third star, 11.5 m, 32″ distant. $44^m\ 20^s$

1867.44	117°4	35″73	3*n*	Δ
1893.13	117.5	36.03	2*n*	Gla

[Δ (**II**) . . . Glasenapp (**II**) . . .]

3647. 36 *Geminorum.* **β** 1193. Discovered with the 36-inch. The *Berlin A. G. Catalogue* gives the proper motion of this star 0″043 in the direction of 208°8. There is a 13 m star, 14°4 : 34″0. 44 21

1899.02	354°7	10″46	1*n*	β

[β (**XVII**) . . . β (3047) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . .]

3649. **S** 538. Probably no motion. 44 39

1877.19	3°2	27″58	1*n*	Cin

[Cin^{4} . . . Wilson (Cin^{10}) . . .]

3650. *Monocerotis* 97. **β** 897. Discovered with the 18½-inch. The principal star (Lalande 13198) has a considerable proper motion: 44 42

Stumpe	0″182 in 170°5
Glasgow 2d	0.225 in 180.0
Porter	0.162 in 183.7

The later measures show that this is common to both components.

1892.00	32°0	6″00	3*n*	β
1898.84	31.8	5.74	1*n*	β

[β (**XIII**) . . . β^{3} . . . β (3114) (*Pub. L. O.* **II**) . . .] (See p. 1068)

3651. **Ho** 26. Discovered with the 18½-inch. 44 44

1897.13	203°3	4″32	1*n*	Ho

[Ho (2778, 3558) . . .] (See p. 1068)

3652. **β** 324. (AC = **S** 537.) The duplicity of the larger star of South's wide pair was discovered with the 6-inch. No apparent change in either of the components. 44 45

A and B

1889.04	203°3	1″71	3*n*	Lv
1892.93	199.0	1.74	1*n*	J
1898.14	203.3	1.93	3*n*	Doo

AB and C (= S 537)

1898.14	281°8	30″63	1*n*	Doo

[β (**VI**) . . . β (2062) . . . Cin^{4} . . . Lv^{1} . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Sellors (3303) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

3653. 59 *Aurigae.* **Σ** 974. (= **H** **IV.** 102 = **S** 536.) H's angle is too small. No change since Σ. The bright star has a proper motion of 0″035 in 86°7 (Auwers). 44 46

1867.00	223°5	22″23	3*n*	Δ

[Ma (**XIII**) . . . Flm . . . Δ (**II**) . . . Big . . .]

44m 47s **3655.** **A. G. 123.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554).

45 0 **3659.** **β 898.** A quadruple in the vicinity of *Sirius;* discovered with the 6-inch. Probably without change.

A and B

1886.11	349°8	3″23	1*n*	LM
1892.00	357.5	3.23	3*n*	β
1898.22	354.8	3.40	1*n*	See
1899.02	353.6	3.01	1*n*	β

C and D

1892.00	270°3	1″91	3*n*	β
1899.02	268.8	1.79	1*n*	β

A and C

1892.00	282°1	96″77	3*n*	β
1898.84	282.5	97.26	1*n*	β

[β (**XIII**)...β3...β (3114)...(*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...LM...See (   )...]

45 16 **3660.** **H 2349.** This is SD (10°) 1679, 8.5 m. The only measures are:

1904.78	286°1	15″89	2*n*	β^6	9.0...12.0

45 18 **3661.** **Hn 82.** Discovered at the Washburn Observatory. No other measures.

[*Pub. Washburn Obsy.* **II, VI**...]

45 31 **3663.** **H 741.** "Large star *red*," H (V). The only measures are:

1904.78	226°6	15″85	2*n*	β^6	7.5...11.0

45 36 **3665.** **Hn 83.** No other measures.

[*Pub. Washburn Obsy.* **II, VI**...]

45 38 **3666.** **H 740.** "*Yellow: blue.*" The later observations show no motion:

A and B

1880.59	8°0	20″84	4*n*	β	8.1...8.5
1900.96	8.0	20.98	2*n*	β	8.2...8.7

B and C

1880.60	283°8	8″18	2*n*	β	...12.5
1900.96	281.7	8.57	2*n*	β	...11.7

[H (**V, VI, VII**)...Ra (**XXIII**)...β3...β5...]

46 12 **3668.** **Hu 616.** Discovered by Hussey (*Bul. L. O.* No. 57).

46 15 **3669.** **Innes 182.** Discovered at the Cape of Good Hope.

[Innes (3438) (*Mon. Not.* **LXII**, 474; **LXIV**, 132)...]

46m 20s **3670.** **Σ 977.** Probably no motion, but late measures are wanting.

1844.28	128°2	1″88	1*n*	Ma
1869.32	128.2	1.86	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Bl (**V**)...]

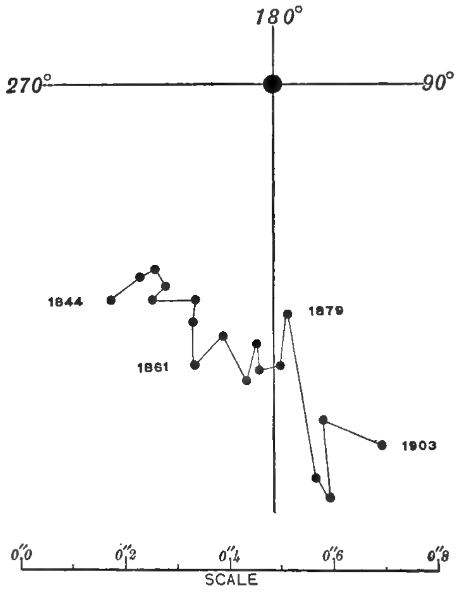
46 23 **3672.** **Innes 431.** (AC = **H** 3896.) In another observation H gives, 10 = 10. Yarnall, 9.5 m. β 161°1 (1877.1) 1*n*. Close pair discovered by Innes. No other measures.

[Innes (*Mon. Not.* **LXIV**, 132)...]

46 49 **3677.** **Arg. 16.** In Arg. "Duplex Cl. III." Found and estimated as given.

46 54 **3678.** 15 *Lyncis.* **OΣ 159.** The close pair is probably a binary system, but the motion of the companion is practically rectilinear to this time. The components have a common proper motion:

Auwers	0″124 in 179°6
Bossert	0.111 in 171.9



15 Lyncis OΣ 159

The following measures are shown on the diagram:

1844.04	323°4	0″53	4*n*	OΣ
1846.32	325.7	0.46	3*n*	OΣ
1848.72	327.9	0.43	5*n*	OΣ
1850.79	332.0	0.45	4*n*	OΣ
1852.66	331.2	0.48	3*n*	OΣ
1855.32	340.4	0.45	2*n*	OΣ
1859.34	341.6	0.49	3*n*	OΣ
1861.84	344.4	0.57	2*n*	OΣ
1867.98	348.7	0.50	3*n*	OΣ
1869.67	355.0	0.58	3*n*	OΣ
1872.66	356.4	0.51	3*n*	OΣ

1875.68	357°0	0″56	3*n*	OΣ
1878.50	1.1	0.55	2*n*	β
1879.31	3.2	0.45	3*n*	Hl
1890.25	5.9	0.77	2*n*	Maw
1891.09	7.5	0.81	3*n*	Hl
1898.27	8.4	0.66	4*n*	Hu
1903.24	16.6	0.73	2*n*	Biesbroeck

The faint star, C, was noted with the 18½-inch in 1878. The only measure since is:

1904.88	346°3	26″25	2*n*	β

The change in distance is due to the proper motion of AB.

OΣ measures a 9.5 m star, the position of which is affected in the same way.

1850.79	167°2	206″65	2*n*	OΣ
1866.30	167.2	204.86	2*n*	OΣ
1904.72	167.4	200.00	1*n*	β

[Ma (**XI, XIII**) .... OΣ (**IX**) (**X**, pp. 69, 192) .... Δ (**I**) .... Δ (2193) .... Flm .... En (1674, 2678) .... Do (2322) .... Sk^2 .... T (2899) .... Big .... Hl (**I, II**) .... β^1 .... β^2 .... β^3 .... Maw (**I, III**) .... Holmes (*Brit. Ast. Ass'n.* **V**, 75) .... Big (*Bul. Ast.* (**XII**, 299) ... HΣ (**XII**) ... Coleman (*Mem. R. A. S.* **LIII**) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ... Biesbroeck ... β^6 ...]

$46^m\ 59^s$ **3679.** **β 325.** Discovered with the 6-inch; the *sf* of a wide pair. Probably fixed. The magnitude in Cord. DM is 7.7.

1884.09	37°0	2″06	1*n*	Wilson
1897.84	37.2	1.81	1*n*	See
1898.10	30.3	1.79	3*n*	Doo

[β (**VI**) .... β (2062) .... Cin^4 .... Wilson (Cin^{10}) .... See (3495) .... Doolittle (*Pub. Flower Obsy.* **I**) ...]

47 12 **3681.** **OΣ 160.** "Aucun compagnon" 1867.1 Δ. The following later measures indicate very little if any motion.

1878.59	172°8	1″38	2*n*	β
1899.14	174.5	1.42	3*n*	Hu
1903.10	171.9	1.42	3*n*	Bowyer

[Ma (**XI**) ... OΣ (**IX**) ... Δ (**I**, p. 228) ... β^1 ... β^3 ... Bowyer and Lewis (*Mon. Not.* **LX**, 499; **LXI**, 486; **LXIII**, 403; **LXIV**, 794) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ...]

47 22 **3685.** *Telescopii* 30. **Σ 978.** Change in angle and distance; probably proper motion.

1844.28	98°4	13″90	1*n*	Ma
1866.97	95.8	15.29	3*n*	Δ
1895.27	91.7	16.55	1*n*	HΣ
1905.07	90.7	16.72	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... HΣ (**XII**) ... β^6 ...]

(See p. 1068)

47 31 **3686.** **A 220.** No other measures.

[A (3784) (*Bul. L. O.* No. 16) ...]

47 39 **3687.** **OΣ (App) 79.** B is W^1 VI. 1417. The only measure is:

1904.77	89°1	115″62	2*n*	β

There is a faint star almost exactly between A and B.

[Δ (**I**) ... β^6 ...]

3688. **Σ 979.** (= **S 539.**) Fixed. $47^m\ 43^s$

1867.24	209°3	7″48	3*n*	Δ

[Ma (**XI**) ... Wr ... Δ (**II**) ...]

3689. **Σ 981.** No change, but the stars have a large common proper motion of 0″308 in 137°0 (Porter). 47 46

1867.23	147°2	3″32	3*n*	Δ
1870.93	148.7	3.32	5*n*	Du
1889.17	144.9	3.30	3*n*	Giacomelli

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... Se^2 ... Ra (**XXIV, XXIX**) ... En (1673) ... Δ (1118) ... Δ (**I, II**) ... Du ... Knorre (3518) ... Giacomelli (**II**) ...]

3690. **OΣ 161** *rej.* (= **Ho 240.**) Rejected in *Poulkowa Catalogue* of 1850. The following are all the measures: 47 46

1843.22	176°7	17″97	1*n*	Ma
1868.08	172.0	19.65	3*n*	Δ
1890.10	172.4	19.62	1*n*	Ho
1898.98	171.6	20.20	3*n*	Hu

[Ma (**XI**) .... Δ (**I**) ... Ho (2977) ... Hu (*Pub. L. O.* **V**) ...]

(See p. 1068)

3692. 38 *Geminorum.* **Σ 982.** (= **H III. 47 = Sh 76.**) Slow retrograde motion, with increasing distance. The components have a common proper motion of 0″124 in 135°8 (Bossert). 47 52

1854.92	168°0	5″94	10*n*	Δ
1864.94	166.1	6.10	8*n*	Δ
1870.91	165.9	6.16	3*n*	OΣ
1882.89	163.3	6.19	7*n*	En
1885.16	162.5	6.47	3*n*	Hl
1890.25	162.0	6.33	3*n*	Maw
1891.81	160.3	6.48	3*n*	HΣ
1903.22	159.7	6.63	2*n*	Biesbroeck

[Ma (**IX, X, XI, XIII, XV**) .... Ma (324) .... Ma (*F. S.* **I**) .... Da^1 .... Da^2 .... Da^3 ... Bes ... P^1. . Auwers (1393) ... Bp ... Fl ... WJ ... J^2 ... Lu (1103) ... K (409) ... Lu (**I, II, III**) ... Se ... Se^3 ... Ba (**I, II, III, IV**) ... Ra (**XXIII, XXX, XXXI, XXXII, XXXVIII**) ... K ... Wr ... Δ (1015, 1110, 1256, 1474) ... Δ (*Mem. Accad. Sci.*) ... Δ (**I, II**) ... Hd ... WS ... Gl ... Du ... Sp (2132) ... Do (2196, 2199) ... Flm ... Pl ... Je (2346) ... Wh ... Bru^2 ... Sk ... Sp (**II**) ... Franz (2590) ... Per ... Per (2684) ... Pt ... En (1673, 2663) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... Hayn (3051) ... Maw (**I**) ... Lewis (*Mon. Not.* **LIV**, 314) ... Lv^1 ... OΣ (**IX**) (**X**, p. 157) ... *A. G. Leipzig*, p. 207 ... Giacomelli (**II**) ... Glasenapp (**III**) ... Cohn (3240) ... Searle (*A. J.* 299) ... Coleman (*Mem. R. A. S.* **LIII**) ... Sk^5 ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Do (3798, 3799) ... Biesbroeck ...]

3693. **Σ 985** *rej.* B is SD (14°) 1713. The only measures are: 47 59

1904.73	322°8	32″54	2*n*	β^6	8.3 ... 8.8

3694. **Σ 973.** (= **S 535.**) Fixed. 48 6

1868.32	28°0	12″03	4*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Ra (**XXIII, XLV**) ... Δ (1118, 1185) ... Δ (**II**) ... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Seagrave (*Sid. Mess.* **II**, 274) ...]

3695. **See 71.** Cogshall adds another companion: 48 11

AB	1899.82	98°2	10″23	2*n*	6.5 ... 13.5
AC	1899.82	248.3	20.05	2*n*	... 13.7

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

$48^m\ 15^s$ **3696.** **Σ 988.** Apparently fixed.

1867.78	264°.6	32″.91	3*n*	Δ

[Ma (*F. S.* **II**) . . . En . . . Δ (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

48 16 **3697.** **Σ 987.** Probably without change.

1867.14	162°.1	1″.10	3*n*	Δ
1903.19	167.3	1.30	5*n*	Jouffray

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Se³ . . . Hd . . . Δ (1110) . . . Δ (**I, II**) . . . Cin⁴ . . . Jouffray (*Bul. Ast.* **XXI**, 299) . . .]

48 17 **3698.** **Σ 983.** (= **H** 403.) Magnitudes in H, 9 . . . 12; *red: bluish.* Unchanged.

1867.91	38°.5	11″.49	3*n*	Δ	8.0 . . . 12.0

[Ma (*F. S.* **I, II**) . . . Ma (**XI, XIII**) . . . Δ (**II**) . . .]

48 19 **3699.** **A G. 124.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

48 19 **3700.** **Σ 986.** (= **H** 744.) No material change.

1866.66	163°.6	5″.29	3*n*	Δ
1894.46	162.7	5.37	3*n*	HΣ

[Ma (*F. S.* **I**) . . . . Ma (**XI, XII, XIII, XV**) . . . . Hd . . . . WS . . . . Gl . . . . Δ (**II**) . . . . HΣ (**XII**) . . . .]

48 25 **3701.** **Σ 984.** No motion.

1867.66	165°.0	5″.56	3*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . .]

48 29 **3702.** **Σ 989.** Noted as double in *A. G. Albany.* Probably unchanged.

A and B

1868.62	212°.4	7″.82	3*n*	Δ
1894.19	213.9	8.20	1*n*	HΣ

A and C

1869.51	74°.0	14″.97	2*n*	Δ
1894.68	74.8	15.30	2*n*	HΣ

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Δ (**II**) . . . H (**V**) . . . HΣ (**XII**) . . .]

48 51 **3705.** **Σ 990.** Little, if any, change.

1869.39	276°.4	3″.03	4*n*	Δ
1878.15	273.1	3.41	1*n*	β

[Ma (*F. S.* **I**) . . . . Ma (**XI**) . . . . H (**VIII**) . . . . Δ (**II**) . . . . Cin⁵ . . . . Wilson (Cin¹⁰) . . . . β¹ . . .]

48 58 **3707.** **Ho 27.** A 9 m star, 163°.2 : 33″.78 (1896.29) 1*n*.

1896.29	125°.6	2″.78	2*n*	Ho

[Ho (2778, 3558) . . .]

(See p. 1068)

3708. **A. G. 125.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554). $49^m\ 11^s$

3710. **Σ 991.** Motion doubtful. 49 40

1868.10	169°.2	3″.73	3*n*	Δ
1903.13	167.0	3.84	1*n*	Do

[Ma (*F. S.* **I**) . . . . Ma (**XI, XII, XIII, XV**) . . . . Flm . . . . Wr . . . . Gl . . . . Δ (**II**) . . . . Do (3930) . . . .]

3711. **Σ 995.** Fixed. 49 40

1868.25	292°.8	21″.47	3*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . En . . . Δ (**II**) . . .]

3712. **A. G. 126.** Double in *A. G. Lund.* Measures by β⁶. 49 45

3713. 17 *Canis Majoris.* **S 540.** (AB = **H** V. 65 = σ 252.) S calls it π^2, but not so in B. A. C., or Arg. U. N. Not a naked-eye star according to Heis and Argelander, but 6 m in B. A. C. The principal star has a proper motion of 0″.031 in 290°.4 (Auwers). 49 52

AB	1898.17	147°.0	44″.38	2*n*	Doo
AC	1898.17	184.3	50.70	2*n*	Doo
AD	1898.17	186.0	130.15	2*n*	Doo

[Ra (**XXIII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

3714. **Σ 992.** Unchanged. 49 55

1867.72	299°.2	13″.50	3*n*	Δ
1878.16	299.6	13.75	1*n*	β

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . β¹ . . .]

3715. **β 326.** Discovered with the 6-inch. No material change. 49 57

1876.19	63°.0	1″.23	2*n*	Hl
1882.21	67.6	1.20	2*n*	Sp
1886.22	58.2	1.47	2*n*	HΣ
1888.20	65.8	1.04	2*n*	Hl
1888.83	64.5	1.13	4*n*	Lv
1893.20	60.5	1.08	1*n*	J

[β (**VI**) . . . β (2062) . . . Δ (**I**) . . . Sp (**II**) . . . Lv¹ . . . Hl (**I, II**) . . . OΣ (**X**) . . . HΣ (**XII**) Jones (*A. J.* 312) . . . Brown (3645) . . .]

(See p. 1068)

3717. **Ho 28.** The only other measures are: 50 0

1897.14	255°.7	6″.45	3*n*	Ho

[Ho (2778, 3558) . . .]

(See p. 1068)

3718. **A. G. 127.** Double in *A. G. Albany,* but "not double" in 1903 by Miller and Cogshall (*A. J.* 554). 50 5

3720. **H 745.** The only later measure is: 50 12

1905.09	289°.7	10″.09	2*n*	β⁶	9.6 . . . 9.8

$50^{m}\ 25^{s}$ **3721.** 19 *Canis Majoris.* **H N. 123.** The principal star has a proper motion of 0″048 in 42°8 (Auwers). The companion is evidently moving with it.

1876.09	17°8	11″33	1*n*	Cin	
1877.11	17.2	11.25	2*n*	Cin	5.7... 9.5
1897.79	1.3	11.80	1*n*	See	4.8...10
1905.12	18.3	11.22	1*n*	β	

[Cin^{3}...Cin^{4}...See (3495)...β^{6}...]

50 27 **3722.** **See 72.** Later measures are:

1899.33	39°1	13″04	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

50 27 **3723.** **Σ 980.** No material change.

1866.04	187°7	3″45	3*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...]

50 30 **3724.** **A. G. 128.** "Dupl.?" in *A. G. Berlin.* Miller (*A. J.* 546) found it not double in 1903.

50 36 **3725.** μ *Canis Majoris.* **Σ 997.** Some of the many measures are not very accordant, but it is certain that the change is very small, if any. In 1864 Dembowski thought the large star was elongated in about 340°, but subsequently it appeared round, and I found it so with the 18½-inch. This star has a proper motion of 0″027 in 282°9 (Auwers).

En connects two distant stars, 288°4 : 90″0; 60°7 : 107″0 (1865.2).

1869.11	338°1	2″88	4*n*	Δ
1878.71	339.0	2.96	4*n*	Sp
1887.24	339.8	2.87	5*n*	Hl
1901.99	334.5	2.32	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VIII**)...H^{1}...WJ^{2}...J^{2}...J^{3}...En (1673)...Δ (1185, 1474, 1574)...Δ (**I, II**)...Se...Se^{3}...Gl...WS...WS^{2}...Fl...Cin^{3}...Cin^{4}...Cin^{5}...Pk...Do(2196, 3378, 3798)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk^{2}...Lv^{1}...Sp (**II**)...Hl (**II**)...T (2991)...Ra (**XXIII**)...]

50 50 **3726.** **Kr 29.** Noted double in *A. G. Hels.*

AB	1898.40	356°1	6″61	3*n*	Doo	9.1... 9.1
BC	1898.40	3.5	15.56	3*n*	Doo	...10.3

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Espin (*Mon. Not.* **LXII**, 532)...]

50 58 **3727.** **O. Stone 16.** Discovered by Stone at Cincinnati.

[Cin^{3}...Cin^{4}...] (See p. 1069)

50 59 **3728.** **Σ 998.** Change uncertain.

1867.09	209°5	3″05	3*n*	Δ
1879.07	208.2	2.88	3*n*	Cin
1893.18	212.6	2.98	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^{5}...LM...Glasenapp (**II**)...]

3730. **H 46.** "A third star 9 m making a very obtuse angle with the other." 51^{m}

3732. *Telescopii* 36. **Σ 994.** (= **H** 3286 = **Espin** 16.) Two small stars near, H (VI). Apparently fixed. 51 21

1866.90	56°4	25″92	3*n*	Δ

[Ma (*F. S.* **II**)...H^{1}...Ra (**XXIII**)...Δ (1185)...Δ (**I, II**)...Espin (3717)(*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n* **III**, 226)....*Annals Toulouse Obsy.* **III**...]

3733. **S 541.** B is O. Arg. S. 5926. No later observations except the following: 51 30

1905.12	43°8	22″74	1*n*	β^{6}

3735. **Σ 996.** Probably without motion. 51 39

A and B

1868.67	167°4	9″51	3*n*	Δ
1905.07	167.5	9.11	1*n*	β

A and C

1868.67	306°8	16″62	3*n*	Δ
1905.07	305.1	16.28	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β^{6}...]

3739. **Σ 1000.** Since Part I of this catalogue was in type, Aitken has discovered the duplicity of the principal star of Σ 1000: 51 59

A and B

1904.94	314°5	0″27	*n*	A	8.2...8.5

AB and C (= Σ 1000)

1867.57	67°0	21″94	3*n*	Δ	7.3...8.0
1904.94	66.8	22.29	3*n*	A	8.0...9.0

[Ma (*F. S.* **II**)...Δ (**II**)...Glasenapp (**II**)...]

(See No. 13117)

3743. **β 899.** Discovered with the 18½-inch. Change in AB is probable. D is W^{2} VI. 1531. All the measures of the close pair are given. 52 9

A and B

1879.14	261°4	0″68	1*n*	β
1889.78	263.9	0.5±	5*n*	Sp
1892.13	268.0	0.58	2*n*	β
1896.11	265.1	0.81	1*n*	Lewis
1900.36	269.8	0.56	5*n*	Gr. Obsy.
1900.93	270.1	0.75	2*n*	Doo

AB and C

1892.13	175°5	24″33	2*n*	β
1899.08	176.0	24.10	1*n*	β

AB and D

1892.13	47°8	40″46	2*n*	β
1899.08	48.1	40.69	1*n*	β

[β (**XIII**)....β^{3}....β (3141)(*Pub. L. O.* **II**)...Sp (**III**)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 499; **LXI**, 486; **LXIV**, 794)...Doolittle (*A. J.* 547)...]

52^m 28^s **3746.** **β 327.** Discovered with the 6-inch. No material change. Some of the later measures are given:

A and B

1881.05	96°.1	0″.75	1*n*	β
1888.10	96.1	0.75	2*n*	Lv
1888.22	95.5	0.84	4*n*	T
1892.08	95.8	0.79	3*n*	β
1893.45	97.7	0.64	4*n*	Sp
1899.09	93.6	0.59	1*n*	β
1903.14	100.0	0.64	2*n*	Bryant

AB and C

1880.63	100°.2	13″.21	2*n*	β	...11.2
1888.22	97.8	13.72	4*n*	T	...11.5
1892.10	100.0	13.10	2*n*	β	...11.6
1899.09	98.9	13.25	1*n*	β	...11.0

[β (**VI**) ... β (2062, 3141) (*Pub. L. O.* **II**) ... β^3 ... Cin^5 ... Lv^1 ... T (2991) ... Sp (**III**) ... Bryant (*Mon. Not.* **LXIV**, 794) ...]

52 38 **3747.** **β 1060.** Discovered with the 36-inch. The only later measure is:

1899.02	59°.3	3″.11	1*n*	β	6.8...13.5

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ...]

52 40 **3748.** **H 406.** This is the same as H 5469 of *Cape Observations*, 205° ± : 5″ ± : 10...11. "Points back to a star 17 m."

52 50 **3750.** **Σ 1003.** Fixed.

1868.46	321°.5	3″.88	3*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ...]

52 50 **3751.** **Σ 1004.** Distance increasing?

1868.00	87°.5	18″.98	3*n*	Δ
1880.73	87.6	19.12	3*n*	β
1898.14	87.1	19.56	3*n*	Doo
1905.07	88.1	19.23	1*n*	β

[En ... Δ (**II**) ... β^3 ... Ma (*F. S.* **I**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... β^6 ...]

52 57 **3752.** 41 *Geminorum.* **OΣ 162** *rej.* Excluded from *Poulkowa Catalogue* of 1850. Measures from Ma (XI), with distance noted as uncertain. Not seen by Dembowski in 1866.0. I could not see it in 1875 with the 6-inch. With the 18½-inch the magnitude of B was called 11.7 m. The only measures are the following, which show no change. The principal star has a proper motion of 0″.033 in 293°.3 (Auwers).

1879.15	154°.9	21″.16	5*n*	β
1898.28	154.8	21.60	4*n*	Doo
1899.24	155.5	21.26	3*n*	Hu

[Ma (**XI**) ... Δ (**I**, p. 228) ... Sadler (*Sid. Mess.* **V**, 218) ... β^1 ... β^3 ... Doolittle (*Pub. Flower Obsy.* **I**) ... Hu (*Pub. L. O.* **V**) ...]

52 59 **3753.** **A. G. 129.** Double in *A. G. Leiden.* Measures by β^6

53^m 15^s **3755.** **β 1022.** Discovered with the 18½-inch. There may be change in both angle and distance of the close pair. The following are all the observations:

A and B

1883.19	160° ±	1″ ±		β
1899.02	133.8	0.48	1*n*	β
1900.80	132.2	0.38	2*n*	A

[β (**XIII**) ... β^3 (App) ... A (*Bul. L. O.* No. 11) ...] (See p. 1069)

53 19 **3756.** **A. G. 130.** (= **Espin 17.**) Double in *A. G. Lund.* Measures by β.

[β^6 ... Espin (3717) (*Mon. Not.* **LXIV**, 679) ...]

53 21 **3757.** **Σ 1001.** No change in AB, and very little, if any, in BC. The larger star is given a proper motion of 0″.040 in 270° (*A. G. Harvard*).

B and C

1858.29	360°.3	1″.87	2*n*	OΣ
1867.30	358.0	1.72	3*n*	Δ
1873.45	359.4	1.66	4*n*	Du

A and B

1867.30	65°.4	8″.85	3*n*	Δ
1873.52	65.3	8.91	2*n*	Du
1903.01	66.7	9.23	1*n*	Hu

[Ma (*F. S.* **I**, 25, 49) ... Ma (**XI, XIII**) ... H^1 ... Δ (**II**) ... Du ... Flm ... WS^2 ... OΣ (**IX**) ... Seagrave (*Sid. Mess.* **II**, 22) ... Big ...]

53 53 **3760.** **Σ 1007** *rej.* (= **β 99.**) "Dif. R. A. of AB = 2^s.25," H (VI). The only measures are:

AB	1905.07	208°.0	67″.89	1*n*	β^6
BC	1905.07	299.8	15.10	1*n*	β^6
BD	1905.07	247.9	22.23	1*n*	β^6

[β (*Mon. Not.* **XXXIII**, 437) ...]

53 54 **3761.** ε *Canis Majoris.* Measures by Maclear. This is the first observation of the companion I have found. The later measures do not show any change. The principle star has a proper motion of 0″.022 in 319°.6 (Auwers).

1856.11	159°.3	7″.15	1*n*	Se
1878.22	160.2	7.42	1*n*	β
1897.04	160.9	7.85	2*n*	See

[Maclear (*Mon. Not.* **XI**, 39; **XXVI**, 246) ... Se^2 ... Se^3 ... Freeman (*Mon. Not.* **XXVI**, 245) ... Cruls (*Anales Imp. Obsy. Rio de Janiero*, **IV**, Part I) ... Cin^4 ... Wilson (Cin^{10}) ... β^1 ... See (3495) ...]

54 7 **3762.** **Σ 1002.** (= **H 2357.**) Fixed.

1867.26	316°.6	30″.30	3*n*	Δ
1903.01	316.5	30.21	1*n*	Hu

[Ma (*F. S.* **II**) ... Δ (**II**) ...]

54 10 **3763.** **Σ 1008.** Fixed.

1867.42	271°.3	2″.43	3*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XI**) ... WS ... Gl ... Sk^2 ... Δ (**II**) ...]

$54^m\ 14^s$ **3764.** **β 100.** Discovered with the 6-inch. No motion.

1880.63	262°0	3″14	2*n*	β
1888.64	258.8	3.17	2*n*	Lv
1892.13	256.0	2.92	1*n*	Collins
1900.78	259.7	3.17	3*n*	Doo

[β (**II**) . . . . β (*Mon. Not.* **XXXIII**, 437) . . . . β^3. . . . Δ (**I**) . . . . Lv^1. . . . Collins (*Proc. Haverford Coll. Obsy.* 1892)(*A. J.* 278) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

54 15 **3765.** **A. G. 131.** Double in *A. G. Albany*. Measures by Miller (*A. J.* 554).

54 28 **3768.** **OΣ 163.** The small star C was added by me with the 18½-inch. Change in the close pair is doubtful.

A and B

1869.91	322°9	0″5±	5*n*	Δ
1879.03	322.7	0.54	1*n*	β
1883.60	325.3	0.51	5*n*	En
1898.08	324.0	0.59	3*n*	Hu

The only later position of the small star is:

1905.07	160°4	14″33	1*n*	β

[OΣ (**IX**) . . . Ma (**XI**) . . . Δ (**I**) . . . β^3. . . En (2678) . . . Brown (3645) . . . Hu (*Pub. L. O.* **V**) . . . β^6. . .]

54 49 **3770.** **A. G. 132.** Double in *A. G. Albany*. Measures by Cogshall (*A. J.* 554).

55 0 **3774.** **H 2355.** Dif. R. A. = $12^s.5$. In Arg. 6.7 m.

55 9 **3775.** **Σ 1005** *rej.* The only measure is:

1903.01	91°7	34″09	1*n*	Hu

55 13 **3776.** **See 74.**

1899.35	232°8	12″76	3*n*	Cg	6.3 . . . 13.7

Cogshall measures a pair of small stars "near See 74."

1899.85	350°6	1″38	3*n*	Cg	10 . . . 11

[See (*A. J.* 431) . . . Cogshall (*A. J.* 505) . . .]

55 18 **3778.** **A. G. 133.** Double in *A. G. Albany*. Measures by Miller (*A. J.* 554).

55 24 **3780.** **S 543.** Since Part I was in type I have identified and measured this pair. It is not Lalande 13625, but a smaller star *sp.* This is the 8.7 m star, SD (22°) 1642, and the place is:

$$\left.\begin{array}{l}\text{R. A.} = 6^h\ 54^m\ 57^s\\ \text{Decl.} = -22^\circ\ 33'\end{array}\right\}$$

Probably no motion:

1905.12	271°7	90″93	1*n*	β^6

3781. **β 572.** Discovered with the 18½-inch. Probably unchanged. Many small stars in the field. This may be Hd 94, given in Hd near this place, and without description. $55^m\ 24^s$

1892.12	142°6	5″27	3*n*	β
1897.80	143.6	5.92	1*n*	See
1899.09	142.4	5.13	2*n*	β

[β (**X**) . . . β^1. . . β^3. . . β (3141)(*Pub. L. O.* **II**) . . . See (3495) . . .]

3782. *Canis Majoris* **124.** **Σ 1011.** (= **H 3908**). Probably unchanged. 55 24

1868.86	298°5	4″25	4*n*	Δ
1883.62	299.7	4.56	2*n*	Wilson

[Ma (*F. S.* **I**) . . . Δ (**II**) . . . Cin^6. . . Wilson (Cin^{10}) . . .]

3783. **A 518.** (AC = **Σ 1010.**) The nearer companion to Σ 1010 discovered by Aitken in 1903. The 36-inch shows several stars nearer than C. No change in that star. 55 27

1868.06	5°2	23″34	3*n*	Δ
1903.03	5.3	23.12	1*n*	A

[Ma (*F. S.* **II**) . . . En . . . Δ (**II**) . . . A (*Bul. L. O.* No. 50) . . .]

3785. **H 3288.** "Taken by mistake for Σ 1007." 55 35

3786. **Hu 704.** With a second measure the mean is: 55 38

1903.73	9°5	0″22	2*n*	Hu

[Hu (*Bul. L. O.* No. 65) . . .]

3787. **A. G. 134.** (AC = **H 609.**) Double in *A. G. Berlin*. Measures of AB by Miller. The only other measures are: 55 38

AB	1903.73	200°1	1″54	2*n*	β	9.1 . . . 9.1
AC	1903.73	352.0	14.12	2*n*	β	. . . 10.0

[Miller (*A. J.* 546) . . . β^6. . .]

3789. **Σ 1006.** Unchanged. 55 47

1868.08	72°3	30″19	4*n*	Δ
1903.01	72.6	30.05	1*n*	Hu

[Ma (*F. S.* **II**) . . . Ra (**XXVII**) . . . Δ (1185) . . . Δ (**I, II**) . . . β (*Mon. Not.* **XXXIV**, 373) . . . Espin (*Mon. Not.* **LXIV**, 676) . . .]

3790. **Innes 183.** Measures by See. 55 54

[Innes (3438)(*Mon. Not.* **LXIII**, 76) . . . See (3495) . . .]

3791. **Hd 96.** "Possibly same as Hd 94." 56 :

3792. **Ho 342.** No other measures. 56 6

[Ho (*A. J.* 215)(3233) . . .] (See p. 1069)

56^{m} 7^{s} **3793.** **Σ 1009.** (= **H̥ I. 69 = S 542.**) Perhaps a little change in the angle. These stars have a common proper motion of 0″046 in 188°9 (*A. G. Harvard*).

1782.86	167°0	....	1*n*	H̥
1870.87	155.6	3″16	5*n*	Δ
1880.26	156.4	3.25	3*n*	Je
1898.08	153.9	3.47	1*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)... H^1... Da^1...Wr... Se... Ba (**II**)...K ...Δ (1256)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...En (1673)...Gl...Du... Do (2199, 3798, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Bl (**V**)... Seagrave (*Sid. Mess.* **II**, 22)...Je (2346)...Big...Knorre (3300)...Ebell (3321) ...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Sk^5...]

56 11 **3794.** **β 573.** Discovered with the 18½-inch. This star is 7.0 m in Radcliffe and SD.

1879.13	248°6	0″75	1*n*	β
1899.19	256.3	0.74	2*n*	β

[β (**X**)...β^1...β^3...Δ (**I**)...Cin^5...]

56 59 **3797.** ζ *Geminorum.* **Sh 77.** (= **H̥ VI. 9 = σ 254 = OΣ (App) 81.**) There is a small star 20″ or 30″ from C in the line of A. The large star has a proper motion of 0″015 in 273°7 (Auwers). C is given a larger motion, 0″127 in 283°4 (*A. G. Berlin*).

1875.07	351°6	93″54	3*n*	Δ
1880.00	351.6	93.67	1*n*	β
1893.30	351.0	94.46	3*n*	Franz
1905.07	350.5	95.13	1*n*	β

[WJ...Mu...Δ (**I**)...β^3...Glasenapp (**III**)...Franz (3464)...Rechenberg (3482) β^6...]

57 7 **3798.** **H 3914.** "Two more bright stars in the field." The only measure is:

1897.76	296°5	11″33	1*n*	See (3495)	7.5...10.8

57 12 **3799.** **H 748.** Measures from H (V). Only one companion seen by H (III), 175°: 6″: 9...14 (1820+). Examined with the 6-inch, and the 16 m seen with difficulty; distance estimated 4″. In Messier 50. The only measures are:

AB	1901.83	171°2	6″85	2*n*	β^{5}	8.4...10.5
AC	1901.83	357.5	15.25	2*n*	β^{5}	...11.5

57 22 **3803.** **Σ 1012.** (= **H 410.**) Fixed.

1867.51	167°3	12″60	3*n*	Δ

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**VII**) ... Δ (**II**)... *Annals Toulouse Obsy.* **III**...]

57 43 **3805.** **Hn 84.** Discovered by Holden at the Washburn Observatory. Measures by Comstock.

[*Pub. Washburn Obsy.* **II, VI**...]

57 51 **3807.** **Σ 1013.** Without material change.

1866.97	37°1	4″61	3*n*	Δ

[Ma (*F.S.* **I**)...Ma (**XI**)...Δ (**II**)...]

3808. **A. G. 135.** Double in *A. G. Lund.* Measures by β^{6}. 58^{m} 1^{s}

3809. **Ho 241.** No other measures. 58 2

[Ho (2977)...] (See p. 1069)

3810. **Ho 29.** Discovered at the Dearborn Observatory. 58 6
No later measures.

[Ho (2778)...] (See p. 1069)

3814. **Σ 1014.** Probably unchanged. 58 20

1868.43	212°6	1″98	3*n*	Δ
1878.06	217.6	1.85	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β^1...]

3816. **A. G. 136.** Double in *A. G. Lund.* Measures by β^{6} 58 29

3817. **H 749.** "A most curious object; a double star involved in a faint round neb., IV, 25." The only measures are: 58 30

1902.51	119°7	14″01	3*n*	β^{6}	10.6...12.7

3818. **β 900.** Discovered with the 18½-inch. Without material change. 58 33

1892.21	273°0	1″70	3*n*	β
1899.20	275.6	1.50	3*n*	Lewis
1900.95	276.2	1.60	2*n*	Doo

[β (**XIII**)...β^3...β (3141) (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LX**, 499; **LXI**, 486) ...Doolittle (*A. J.* 547)...]

3821. **OΣ 164** *rej.* Rejected in *Poulkowa Catalogue* of 1850. Magnitudes from catalogue of 1843; measures from Ma (XI). Not measured by Dembowski. If Madler's distance is correct, there has been some change. The only later observations are: 58 51

1899.35	50°7	14″17	4*n*	Hu	7.0...12.0
1901.30	50.2	13.65	2*n*	β	7.3...11.2

[Ma (**XI**)...Δ (**I**, p. 228)...Hu (*Pub. L. O.* **V**)...β^5...]

3822. **A. G. 137.** Double in *A. G. Leiden.* Measures by β^{6}. 58 56

3823. **Σ 1016.** Fixed. 59 1

1868.91	150°0	5″40	4*n*	Δ
1880.76	150.8	5.25	3*n*	β

[Ma (**XIII**)...WS...Sk...Sk^3...Δ (**II**)...β^3...]

3824. **Σ 1015.** Fixed. 59 2

1868.14	197°2	4″76	3*n*	Δ
1878.17	197.0	4.76	2*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^5...]

$59^{m}\ 59^{s}$ **3829.** **H 47.** "Triple; the large star the intensest *orange*—very beautiful." On two nights in 1904 I looked for this star, but failed to find anything answering the description. Herschel's place is that of the 9.7 m star, SD (5°) 1963.

0 1 **3830.** **Hu 705.** The mean of two measures, including the one given in Part I, is:

1903.72	219°.6	0″.52	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

0 10 **3832.** *Canis Majoris* 136. *Δ* 12. (AC = Σ 1019.) The nearest companion was discovered by Dembowski in 1867. There is no change in C, and probably none in B.

AB	1881.14	281°.9	6″.14	1*n*	β
	1905.09	280.9	6.27	1*n*	β
AC	1867.73	294.8	37.88	3*n*	Δ
	1905.09	294.2	38.04	1*n*	β

[Ma (*F. S.* II)...Δ (1735)...Δ (II, p. 177)...Cin5...β3...β6...]

0 13 **3833.** **H 750.** The only later measure is:

1879.77	91°.4	8″.63	1*n*	Cin6

(See p. 1069)

0 14 **3834.** **Σ 1017.** Fixed.

1866.92	254°.2	12″.49	3*n*	Δ
1893.13	255.4	12.41	2*n*	Gla

[Ma (*F. S.* I)...Ma (XI)...H (VI)...Δ (II)...Glasenapp (II)...]

0 50 **3836.** **Σ 1018.** Fixed.

1867.26	17°.0	9″.37	3*n*	Δ
1905.08	18.1	9.78	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β6...]

1 3 **3839.** *Canis Majoris* 139. **β 328.** (AC = Σ 1026 *rej.*) The large star of this wide pair was found to be a close double with the 6-inch. Motion is uncertain. This is a naked-eye star in *Canis Major*, 6 m in Argelander, Heis, and *Pos. Med.* Lalande 13811.

Some of the later measures are:

1879.13	117°.8	0″.48	1*n*	β
1880.44	122.3	0.51	4*n*	Sp
1887.18	116.1	0.42	2*n*	Sp
1892.11	118.0	0.51	4*n*	β
1893.23	119.2	0.5±	2*n*	Sp
1899.26	132.3	0.43	1*n*	β

AB and C (= Σ 1026 *rej.*)

1892.04	348°.9	17″.45	3*n*	β
1899.26	350.3	17.40	1*n*	β

[β (VI)...β (2062, 3114)...β3...β (*Pub. L. O.* II) (*Pub. Y. O.* I)...Δ (I)...Cin5...Sp (II, II App., III)...]

$1^{m}\ 11^{s}$ **3840.** **Σ 1023.** Fixed. The principal star is given a proper motion of 0″.006 in 225°.5 (Battermann).

1867.30	102°.1	24″.71	3*n*	Δ
1893.10	103.0	24.50	2*n*	Gla

[Ma (*F. S.* II)...Δ (II)...Glasenapp (II)...*Annals Toulouse Obsy.* III...]

1 18 **3841.** **β 574.** Discovered with the 18½-inch. The later measures are:

1892.04	311°.3	2″.26	3*n*	β
1898.88	302.3	2.28	1*n*	β

[β (X)...β1...β (3114) (*Pub. L. O.* II)...]

1 22 **3843.** **Σ 1022.** *Telescopii* 45. Unchanged.

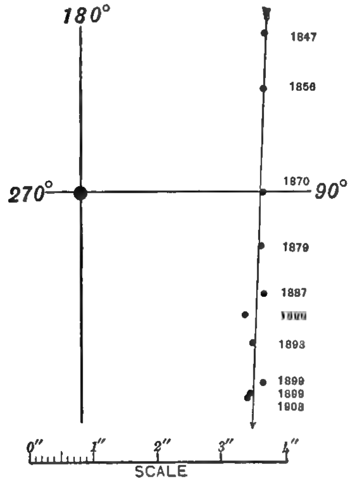
1869.08	128°.3	5″.63	4*n*	Δ
1905.08	123.5	5.85	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β6...]

1 29 **3844.** o, 45 *Geminorum.* **OΣ 165.** The change in the companion is due to the proper motion of the principal star, which is given:

Auwers	0″.107 in 192°.5
Hussey	0.106 in 183.6

The first is from meridian observations, and the other the most probable result from the measures of the companion, 1847-99.



45 Geminorum OΣ 165

This movement will appear from the following selected epochs, which are shown on the diagram:

1847.22	130°.7	3″.87	2*n*	OΣ
1856.74	119.3	3.33	2*n*	OΣ
1870.24	89.7	2.89	2*n*	OΣ
1879.19	73.1	2.98	3*n*	Hl
1887.05	60.7	3.31	3*n*	Hl
1890.96	53.0	3.25	3*n*	β
1893.28	48.6	3.62	1*n*	Lewis
1899.13	43.4	4.11	3*n*	Hu
1899.88	40.1	4.13	5*n*	Doo
1903.83	38.8	4.14	3*n*	β

[OΣ (**IX**)(**X**, pp. 192, 212) ... Δ (**I**, p. 228) ... Flm ... Pt ... Sk^3 ... Ho (*A. J.* 215) ... Hl (*Wash. Obsns.* 1886) ... Hl (**I, II**) ... Gore (*Mon. Not.* **XLVII**, 61) ... β^1 ... β (3048) (*Pub. L. O.* **II**) ... Lewis (*Mon. Not.* **LIV**, 314; **LX**, 499; **LXI**, 486) ... Ho (3234) ... Big (*Bul. Ast.* **XII**, 299) ... Hu (*Pub. A. S. P.* **XII**, 200) (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ... β^6 ...]

1^m 32^s **3845.** **Σ 1021.** Unchanged.

1868.40	10°.8	4″.02	3*n*	Δ
1905.08	12.0	4.01	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XII, XIII**) ... Gl ... WS ... Bl (**V**) ... Δ (**II**) ... β^6 ...]

1 45 **3847.** **Σ 1020.** Fixed.

1866.65	284°.7	13″.30	3*n*	Δ
1905.11	284.8	13.36	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Bl (**V**) ... β^6 ...]

1 50 **3848.** **H 2362.** "Fine." B is DM (3°) 1561. The only measures are:

1879.82	187°.2	28″.63	1*n*	Cin^6
1905.14	188.2	28.41	1*n*	β^6

1 51 **3849.** **Σ 1027.** Fixed.

1866.90	355°.9	6″.98	3*n*	Δ
1890.02	355.4	6.98	3*n*	Giacomelli

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H^1 ... Wr ... Se ... Se^3 ... Ra (**XXIV**) ... Du ... Δ (1118) ... Δ (**I, II**) ... Per ... Per (2684) ... *Annals Toulouse Obsy.* **III** ... Giacomelli (**II**) ...]

1 51 **3850.** **H 2363.** "Unless R. A. is 36^s more." This star is probably Cord. DM (27°) 3632, which has about the place given here.

2 1 **3851.** **Σ 1029.** No sensible change.

1867.17	26°.3	1″.91	3*n*	Δ
1878.10	24.3	1.90	2*n*	Cin

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... H (**V**) ... Se ... Se^3 ... Ra (**XXIV**) ... Δ (**I, II**) ... Gl ... Cin^5 ... *Annals Toulouse Obsy.* **III** ...]

2 3 **3852.** **Σ 1024.** Unchanged.

1867.73	313°.3	1″.30	3*n*	Δ
1890.26	312.2	1.28	3*n*	T

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Δ (**II**) ... Bl (**V**) ... T (3185) ...]

2 14 **3853.** **Ho 519.** (AC = **OΣ** (App) 83.) The faint star discovered by Hough. The only later measure of this is:

1903.50	117°.3	20″.30	2*n*	β	...13.5

C is W^2 VI. 1874. Both of the large stars have some proper motion:

Proper Motion of A

Porter	0″.209 in 220°.3
Battermann	0.227 in 219.0
Rechenberg	0.216 in 223.0

Proper Motion of C

Battermann	0″.057 in 249°.7
Rechenberg	0.066 in 276.0

The later measures of AC are:

1876.06	87°.6	104″.67	2*n*	Schur
1892.85	86.1	107.39	4*n*	Franz
1903.15	85.3	108.46	3*n*	β

[Δ (**I**) ... Schur (2255) ... Ho (3557) ... Franz (3464) ... β^6 ...]

(See p. 1069)

3854. **Σ 1028.** No change. 2^m 36^s

1867.73	302°.5	10″.67	3*n*	Δ
1905.14	303.4	10.82	1*n*	β

[Ma (*F. S.* **I**) ... Δ (**II**) ... β^6 ...]

3855. **Hu 618.** Discovered at the Lick Observatory by Hussey (*Bul. L. O.* No. 57). 2 43

3858. **Σ 1025.** The measures are conflicting, but change probable. 2 56

1843.21	140°.4	21″.91	1*n*	Ma
1866.12	138.1	23.29	3*n*	Δ
1898.42	135.8	24.16	3*n*	Doo
1904.37	133.3	24.44	3*n*	Miller

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Δ (1185, 2194) ... Δ (**I, II**) ... Ra (**XXVII**) ... Flm ... Bl (**V**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... *Annals Toulouse Obsy.* **III** ...]

(See p. 1069)

3860. **Σ 1030.** Fixed. 3 3

1867.46	43°.0	15″.79	3*n*	Δ
1879.08	43.2	15.59	2*n*	Cin
1905.14	43.9	15.61	1*n*	β

[Ma (*F. S.* **I**) ... H (**V**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

3861. **Σ 1031.** C from H (VIII); not in Σ. The only other measures are: 3 5

1879.18	349°.7	12″.02	1*n*	β	...12.0
1903.83	352.6	12.04	2*n*	β	

Apparently no change in AB:

1867.52	248°.2	3″.74	3*n*	Δ
1879.48	248.9	3.51	3*n*	β
1903.83	249.1	3.60	2*n*	β

[Ma (*F. S.* **I**) ... Δ (**II**) ... β^1 ... β^3 ... Cin^5 ... Wilson (Cin^{10}) ... β^6 ...]

3862. τ *Geminorum.* **β 1009.** Discovered at Mt. Hamilton with the 12-inch in 1881. Auwers gives the proper motion, 0″.064 in the direction of 223°.1. The measures are sufficient to show from the common proper motion that this is a physical pair. The following are all the later measures: 3 30

1890.96	177°.6	1″.75	4*n*	β
1899.22	183.6	2.10	1*n*	Lewis
1901.44	178.1	1.68	3*n*	A

[β (**XIII**) .... β^3 .... β (3048) (*Pub. L. O.* **II**) .... Lewis (*Mon. Not.* **LX**, 499) .... A (*Bul. L. O.* No. 11) ...]

$3^m\ 35^s$ **3863.** **Σ** 1034. Fixed.

1868.17	16°8	2″29	3*n*	Δ
1879.49	15.8	2.39	2*n*	Cin
1905.14	17.1	2.21	1*n*	β

[Ma (*F. S.* I)...Δ (**II**)...β¹...Cin⁵...Cin⁶...β⁶...]

4 9 **3866.** *Canis Majoris* 146. **β** 329. Distant companion noted with 6-inch. A naked-eye star (Lalande 13928); Heis 6m; SD 7.2; Cordoba 6.6. See notes a nearer star, 14.8m, 110°: 6″5, which I could not see on the occcasion of the last measures with the 40-inch; and it was looked for by Aitken with the 36-inch on two nights in 1899 without success. It is practically certain that it does not exist.

1892.12	96°8	29″84	3*n*	β
1898.16	96.5	30.02	1*n*	See
1898.80	97.3	29.78	2*n*	β

[β (**VI**)...β (2062, 3141)...β³...β (*Pub. L. O.* **II**)...See (   )...A (3638)...]

4 26 **3869.** **β** 1279. This was noted with the 18½-inch on December 16, 1878, but forgotten subsequently, and not measured or included in my catalogues of that time. A recent examination of my old observing book led to its recovery with the 40-inch. This instrument shows a 13m star, 349°8: 14″2.

1901.10	13°4	1″08	3*n*	Doo

[β (*Pub. Y. O.* I)...Doolittle (*A. J.* 547)...]

4 46 **3871.** **Ho** 30. The only later measure is:

1894.18	125°5	5″82	1*n*	Ho

[Ho (2778, 3558)...]

(See p. 1069)

4 49 **3872.** **Σ** 1035. (= **S** 544.) Fixed.

1866.68	41°4	8″41	3*n*	Δ
1893.10	41.3	8.34	2*n*	Gla

[Ma (*F. S.* I)...H¹...Ma (**XI**)...H (**II**)...Se¹...Se³...Ra (**XXIII**)...Δ (1110) Δ (**I, II**)...Glasenapp (**II, III**)...Giacomelli (**II**)...]

4 50 **3873.** **Σ** 1032. Probably some change in the angle.

1867.19	103°8	2″68	3*n*	Δ
1902.72	108.0	2.91	1*n*	Hu

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...H (**V**)...Δ (**II**)...Sk...Gl...WS...Bl (**V**)...Sk⁵...]

5 19 **3875.** **Σ** 1033. (= **H** I. 76.) No change in AB. The distant star is not in Σ.

A and B

1871.01	280°2	1″46	6*n*	Δ
1901.82	278.1	1.73	2*n*	β

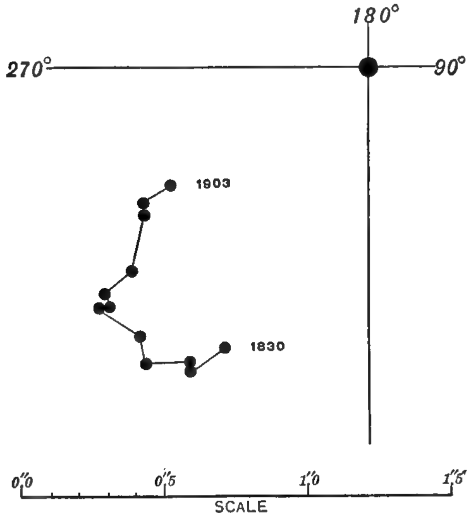
A and C

1880.53	271°7	78″80	2*n*	Bl
1901.82	271.6	79.65	3*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...OΣ (**IX**)...Se...H (**V**)...Δ (1118)...Δ (I, II)... Du...Bl (**V**)...Coleman (*Mem. R. A. S.* **LIII**)...β⁶...]

3876. **Σ** 1037. (AC = OΣ 166 *rej.*) The principal stars probably form a binary system, but thus far the motion has been very slow. The following selected positions will be sufficient to show the extent of the relative change since Struve. $5^m\ 21^s$

1830.42	232°7	1″11	6*n*	Σ
1840.28	329.6	1.24	2*n*	OΣ
1847.74	328.7	1.21	2*n*	OΣ
1868.23	322.8	1.30	3*n*	OΣ
1871.24	319.4	1.24	3*n*	OΣ
1876.15	311.6	1.27	3*n*	Hl
1877.73	312.8	1.24	4*n*	Sp
1884.18	310.6	1.23	2*n*	Per
1889.20	310.6	1.10	3*n*	Hl
1897.94	303.2	0.95	3*n*	Hu
1903.02	301.1	0.93	3*n*	Do
1903.69	301.2	0.76	6*n*	Biesbroeck



Σ 1037

The faint star is not in Struve. It was not measured by OΣ, and not seen by Madler and Dembowski. About 1876 I could see it with the 6-inch. The only measures are:

1899.95	110°6	16″32	3*n*	Hu	...13.0

[Ma (*F. S.* **I**, 258)...Ma (**IX, X, XIII, XV**)...Ma (**XI**) called OΣ 166...OΣ (**IX**) (**X**, p. 158)...Ra (**XXX, XXXI**)...K...K (1519)...Wr...Hd...H (**VII**)...En (1673, 2663)...Δ (1026, 1110, 1256, 1474)....Δ (**I, II**)...Δ (*Mem. Accad. Sci.*) Da³...Se...Se³...WS...WS²...Du...Flm...Pl...Sk...Gl...Bru² (called Σ 2037)...Do (2199, 2989, 3798, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Je (2346, 2449)...Per...Per (2684)...Sp (**II**)...T (2898)...Ra (**XLVII**)... Hl (**I, II**)...*Proc. Haverford Coll. Obsy.* 1891...Big...Jones (*A. J.* 312)... Glasenapp (**II**)...Holmes (*Brit. Ast. Ass'n* **V**, 78)...Big (*Bul. Ast.* **XII**, 299) ...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)...Knorre (3300)...Hu (*A. J.* 427)...Morgan (*A. J.* 439)...Coleman (*Mem. R. A. S.* **LIII**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 499; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Je (3802)...Maw (**IV**)...Sk⁵...Biesbroeck...]

3877. **H** N. 94. In H, "triple Cl. IV." I could not find any pair in this place. W² VII. 207 (7), $2^m\ 47^s$ *f*, has a distant companion at 270°, but it is more likely to be OΣ 168 *rej.*, which has the same R. A., but 40′ *s*. That star is a wide triple. 5 36

$5^m\ 38^s$ **3878.** **OΣ 168** *rej.* One of the rejected Poulkowa stars. The only other measures are:

A and B

1899.58	66°0	24″21	2*n*	Hu
1900.97	66.7	23.99	2*n*	β

A and C

1899.58	114°4	52″02	2*n*	Hu
1900.97	114.3	51.83	2*n*	β

From a comparison of his measures with those of Dembowski, Hussey finds for the proper motion of A, 0″047 in 126°6.

[Δ (I)...Hu (*Pub. L. O.* **V**)...β^5...]

5 46 **3880.** **OΣ 167.** Unchanged.

1867.89	156°7	5″29	3*n*	Δ
1898.99	157.0	5.38	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

5 58 **3882.** **Weisse 14.** Noted "Duplex 2″" in W^2. Examined and estimated as given (1875). The only measures are:

1901.49	157°1	2″21	2*n*	β^5	8.2...8.7

6 1 **3885.** Measures by Aitken. Double in *A. G. Wein.*

6 13 **3887.** **H 3934.** In O. Arg. S. 7 m. The only measures are:

1877.15	235°2	13″73	2*n*	Cin^4

6 18 **3890.** **OΣ 520.** The motion, if any, is slow. It is not a difficult pair as it was found independently with the 6-inch in 1874.

1860.90	355°7	Cun	4*n*	Δ
1883.69	354.0	0″56	6*n*	En
1898.91	357.5	0.65	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Flm...En (2678)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

6 27 **3892.** **β 196.** Discovered with the 6-inch. The *f* one of three stars in the field.

1880.22	189°7	3″33	1*n*	β	9.5...11.0
1882.12	191.1	2.92	1*n*	W	9.0...11.0
1899.09	189.8	3.26	1*n*	β	9.0...10.0

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (I)...Cin^5...Wilson (Cin^{10})...]

6 29 **3893.** 51 *Geminorum.* **H VI. 74.** (= σ 255.) The principal star has a proper motion of 0″033 in 172°5 (Auwers). The only later observations are:

AB	1903.74	20°1	149″03	2*n*	β^6	...10.5
AC	1903.74	37.0	221.18	2*n*	β^6	...10.5

3894. **Σ 1043.** Without change. $6^m\ 30^s$

1868.49	246°6	2″37	3*n*	Δ
1888.05	245.3	2.41	1*n*	Lv

[Ma (*F. S.* I)...Ma (**XI, XV**)...Hd...Gl...Δ (**II**)...Cin^5...Lv^1...]

3899. **Σ 1045.** Probably without change. 6 42

1868.08	229°5	5″73	3*n*	Δ
1879.79	228.3	5.82	1*n*	Cin
1893.18	231.6	5.69	2*n*	Gla

[H^1...Ma (*F. S.* **I**)...Ma (**XV**)...Hd...Δ (**II**)...Gl...Cin^6...Glasenapp (**II**) ...*Annals Toulouse Obsy.* **III**...]

3901. **Σ 1041** *rej.* This star is probably DM (18°) 1529. 6 44:

1905.09	267°0	24″49	1*n*	Miller	8...11

(See p. 1069)

3902. **β 197.** Discovered with the 6-inch. Without change. 7 0

1879.22	148°2	1″92	1*n*	Cin
1886.94	144.8	2.21	1*n*	LM
1888.10	147.8	2.17	3*n*	Lv
1900.78	146.8	2.10	3*n*	Doo

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (**I**)...Cin^5...LM...Lv^1...Doolittle (*Pub. Flower Obsy.* **I**)...]

3904. **Σ 1040.** No motion. 7 20

1868.16	259°2	7″26	3*n*	Δ
1904.04	260.8	7.23	2*n*	β

[Ma (*F. S.* I). Ma (**XI**)...H (**V**)...Δ (**II**)...β^6...]

3905. 52 *Geminorum.* **Ho 343.** The large star has some proper motion: 7 22

Bossert 0″114 in 151°5
A. G. Berlin 0.111 in 160.7

The only later measures are:

1903.74	262°9	23″16	2*n*	β	...11.6

[Ho (3233)...β^6...]

(See p. 1069)

3906. **Σ 1042.** Unchanged. 7 25

1867.78	40°9	12″01	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...]

3907. **Σ 1044.** Fixed. 7 27

1867.24	168°1	12″10	3*n*	Δ
1904.04	167.4	12.61	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^6...]

3908. **Σ 1039.** Fixed. 7 27

1869.17	207°2	3″11	4*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...]

$7^m\ 28^s$ **3909.** **Σ 1047.** Change, probably from proper motion.

1844.24	19°.3	21″.64	1*n*	Ma
1868.36	22.3	21.51	4*n*	Δ
1904.30	24.1	22.16	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (2194) ... Δ (**II**) ... Flm ... Sk^2 ... Pt ... Sk^5 ... Do (3930) ... β^6 ...]

7 39 **3910.** **Hn 85.** Discovered by Holden; measures by Comstock. Nothing later.

[*Pub. Washburn Obsy.* **II, VI** ...]

7 45 **3912.** **β 1023.** This star was suspected with the 18½-inch to be a close pair in 1882, and subsequently verified and measured with the 36-inch. The later measures are:

1898.27	294°.6	0″.38	1*n*	A
1900.54	296.3	0.26	6*n*	Gr. Obsy.

[β (**XIII**) ... β^3 (App) ... β (3114) (*Pub. L. O.* **II**) ... A (3584) ... Greenwich Obsy. (*Mon. Not.* **LX**, 499; **LXI**, 486; **LXIII**, 403) ...]

7 50 **3913.** **Σ 1046.** H (V) could not find it. Readily seen with the 6-inch March, 1875. Later measures make the distance smaller.

1867.77	234°.2	10″.92	3*n*	Δ
1903.00	237.6	10.68	2*n*	Do
1903.85	235.8	10.62	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... Δ (2194) ... Δ (**II**) ... Flm ... Pt ... Sk^2 ... *A. G. Leipzig*, p. 207 ... Do (3930) ... β^6 ...]

7 54 **3914.** **Σ 1038.** Fixed.

1866.94	96°.2	11″.35	3*n*	Δ
1879.19	96.6	11.08	1*n*	Do
1905.08	95.4	11.73	1*n*	β

[Ma (*F. S.* **I**) .... Ma (**XI**) .... Δ (**II**) .... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... β^6 ...]

7 54 **3915.** **Σ 1048.** Fixed.

1869.13	350°.3	5″.74	4*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Δ (**II**) ...]

7 57 **3918.** **Σ 1049.** Probably no change, but the later measures indicate that Σ's angle is too small.

1843.13	41°.8	3″.65	1*n*	Ma
1867.72	42.7	3.50	3*n*	Δ
1880.06	42.9	3.61	1*n*	β
1886.13	42.7	3.79	1*n*	Wilson
1904.03	42.0	3.38	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XV**) ... Δ (1800) ... Δ (**II**) ... Flm ... Sk ... Pt ... Sk^2 Sk^5 ... Cin^5 ... Wilson (Cin^{10}) ... Do (2303) ... Jones (*A. J.* 312) ... β^3 ... β^6 ...]

8 **3919.** **Lewis 8.** The place given by Lewis is the same as that given of β 1023.

[Lewis (*Mon. Not.* **LXI**, 486) ...]

8 10 **3920.** *Argus* **101.** **β 757.** Discovered with the 6-inch on Mt. Hamilton in 1879. This is a naked-eye star in *Argo.* Lacaille 2668. There would appear to be some change in distance, but this needs confirmation. There is a wide difference in the magnitudes assigned to the smaller star.

1887.23	67°.7	2″.57	2*n*	Pollock	6.5 ... 8.0
1893.15	62.6	2.66	2*n*	Sellors	7 ... 9
1897.20	69.2	3.06	2*n*	See	6.3 ... 11.8
1903.16	69.1	3.01	2*n*	Scott	6.5 ... 9.4

[β (**XI**) ... β^2 ... Russell (*Mon. Not.* **XLVII**, 473) ... Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* **L**) ... Sellors (3240) ... See (3495) ... Pt ... Do (3798) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

3925. **H 3938.** Probably fixed. The star measured by Scott seems to be another pair. $8^m\ 43^s$

1885.14	250°.7	19″.78	1*n*	Wilson	7.0 ... 9.5
1898.20	249.6	19.94	3*n*	Doo	7+ ... 8

[Cin^6 .... Wilson (Cin^{10}) .... Scott (*Brit. Ast. Ass'n* **VI**, 248) .... Doolittle (*Pub. Flower Obsy.* **I**) ...]

3927. **Σ 1052.** Fixed. B is SD (10°) 1935. 8 52

1867.77	21°.9	19″.87	3*n*	Δ

[Ma (*F. S.* **I**) ... En ... Ra (**XXIII**) ... Δ (**II**) ...]

3931. 24 *Monocerotis.* **β 1268.** This is one of the rejected stars (OΣ 169) of the *Poulkowa Catalogue.* In the edition of 1850 it was given as "oblong?" the direction of the suspected elongation being roughly measured on two occasions 199° and 204°. Madler has two observations (*Dorpat Observations* XI, XIII), 26°.4 : 0″.5 (1843.28) and 22°.2 : 0″.35 (1846.24). Subsequently Dembowski (*Measures*, Vol. I, 228) thought it might be elongated at 148°, but very uncertain. In 1873 I had a faint suspicion of a slight elongation in 310°, but it was very doubtful in 1874. It was finally rejected as single by Otto Struve, and is probably not a close pair. It was certainly round in 1892 with all powers on the 36-inch. In the course of this examination I found the faint companion given above. It is not probable that this has anything to do with the early observations previously mentioned. The faintness of this star is a sufficient explanation of the failures to see it with other telescopes. 9 11

Auwers gives for the proper motion of this star, 0″.031 in the direction of 284°.9. The measures do not cover a sufficient time to show with certainty whether the small star shares in this movement.

These are all the later measures:

1898.94	310°.6	3″.90	2*n*	A	6.0 ... 13.0
1899.32	310.5	3.92	3*n*	Hu	

[β (**XIX**) ... β (3141) (*Pub. L. O.* **II**) ... A (3584) ... Hu (*Pub. L. O.* **V**) ...]

3932. **Hn 86.** Discovered at the Washburn Observatory. 9 20

[Hn (*Pub. Washburn Obsy.* **II**) ... Com (**VI**) ...]

3933. **Pritchett.** The place given in the *Pub. Morrison Observatory* is about 40^s *p* and 4′ *n* of Σ 1046, but it is really *nf.* Identified as given in Part I, and measured: 9 21

1903.87	219°.8	7″.90	2*n*	β^6	9.4 ... 9.4

$9^m\ 21^s$ **3934.** *Canis Majoris* 156. **β** 575. (AC = Σ 1057.) The duplicity of the principal star of Σ 1057 was discovered with the 18½-inch. Change in angle is probable. Lalande 14114.

There is no sensible change in the distant star, C.

A and B

1889.15	199°9	0″70	1*n*	Lv
1899.19	216.0	0.64	1*n*	A
1904.20	222.4	0.70	2*n*	Biesbroeck

AB and C (= Σ 1057)

1867.99	1°5	15″50	3*n*	Δ
1878.10	2.1	15.87	2*n*	β
1899.19	1.5	15.50	1*n*	A

[β (X)...β^1...Cin^5...Lv^1...Ma (*F. S.* I)...Δ (II)...A (3638)...Biesbroeck...]

9 30 **3935.** Σ 1056. Fixed.

1868.42	298°2	3″79	3*n*	Δ
1893.15	299.0	3.55	2*n*	Gla

[Ma (*F. S.* I)...H (VII)...Δ (II)...LM...Cin^5...Cin^6...Glasenapp (II)... *Annals Toulouse Obsy.* III...]

9 30 **3936.** Σ 1053. (= **H** 414.) Fixed. The principle star has a proper motion of 0″033 in 226°8 (Battermann).

1867.19	311°4	13″83	3*n*	Δ
1894.19	310.3	13.83	1*n*	Ho

[Ma(*F. S.* I)...Ma (XI)...Δ (II)...Ho (3558)...*Annals Toulouse Obsy.* III...]

9 38 **3937.** **Ho** 344. The *s* star of a triangle. No other measures.

[Ho (*A. J.* 215) (3233)...]

(See p. 1069)

9 39 **3938.** **Howe** 17. Probably fixed.

1892.11	314°7	2″78	2*n*	Lv

[Cin^5...Lv^1...LM...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

10 6 **3943.** Σ 1050. Fixed.

1866.69	19°1	19″30	3*n*	Δ
1889.18	19.1	19.13	2*n*	Toulouse
1905.11	19.6	19.02	1*n*	β

[Ma (*F. S.* II)...Ra (XXIII)...Δ (1204)...Δ (I, II)...Bl (V)...*Annals Toulouse Obsy.* III...β^6...]

10 10 **3944.** Σ 1054. Fixed.

1866.33	291°1	18″66	3*n*	Δ
1889.16	289.7	18.64	1*n*	Toulouse

[Ma (*F. S.* I)...Δ (II)...Bl (V)...Ma (XI)...*Annals Toulouse Obsy.* III...]

10 15 **3945.** **H** 2366. "A third star 18″ forms a right angle at A."

10 16 **3946.** Σ 1058. Either the companion is variable, or the attempts to find this pair have been singularly unfortunate. Δ could not see it 1865.97, nor could I with the 6-inch on 3*n* in 1874–75. In February, 1878, I examined the region very carefully with the 18½-inch, with no better success. A year later another attempt was made with the same instrument, and the pair readily seen and measured. The place in *Mens. Micr.* is correct. The stars seem to be relatively fixed.

1844.13	283°0	22″47	1*n*	Ma	
1879.87	280.7	22.55	4*n*	β	8.4...10.6
1903.09	282.0	22.32	2*n*	β	

[Ma (*F. S.* I)...Ma (XI)...Δ (1736)...β^1...β^3...β^6...]

3947. Σ 1060. Fixed. $10^m\ 22$

1867.54	24°2	6″76	3*n*	Δ
1885.16	25.2	6.90	1*n*	Wilson

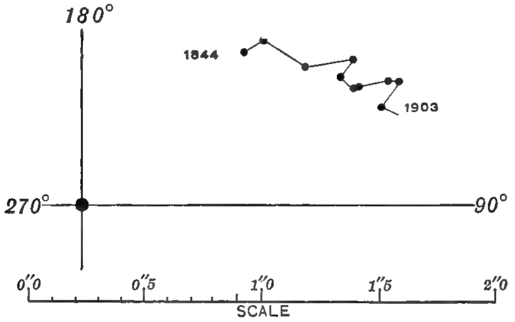
[Ma (*F. S.* I)...Hd...Δ (II)...WS...WS2...Gl...Wilson (Cin^{10})...]

3948. 47 *Camelopardali.* Σ 1055. Probably fixed, but common proper motion of 0″068 in 276°8 (Auwers). 10 46

1844.32	338°6	2″52	2*n*	Ma
1867.61	339.4	2.31	4*n*	Δ
1905.10	328.8	1.81	2*n*	Miller

[Ma (*F. S.* I)...Ma (XI, XIII)...Δ (II)...]

3949. OΣ 170. Probably a physical pair, but the apparent motion to this time is practically rectilinear. The components have a proper motion of 0″12 in 180°0 (Bossert). 11 5



OΣ 170

1844.79	133°0	0″96	2*n*	OΣ
1849.25	132.0	1.06	2*n*	OΣ
1867.13	121.5	1.30	3*n*	Δ
1871.99	117.8	1.33	2*n*	Δ
1877.26	116.1	1.25	4*n*	Sp
1882.25	114.7	1.30	4*n*	Je
1893.15	112.9	1.30	3*n*	Jones
1894.44	111.7	1.43	4*n*	HΣ
1898.08	110.9	1.47	4*n*	Hu
1903.17	107.7	1.36	4*n*	Gr. Obsy.

[Ma (XI, XIII)...OΣ (IX)...Δ (I)...Flm...Du...Sk^3...Sp (II)...En (2678)... Je (2449)...Jones (*A. J.* 312)...Lv^1...β^3...Greenwich Obsy. (*Mon. Not.* LIV, 314; LIX, 400; LX, 499; LXI, 486; LXIV, 794)....Maw (I, III)....Brown (3645)...Coleman (*Mem. R. A. S.* LIII)...*A. G. Leipzig*, p. 247...Hu (*Pub. L. O.* V)...HΣ (XII)...Biesbroeck...]

3950. **Hu** 619. Discovered by Hussey (*Bul. L. O.* No. 57). 11 12

11m 12s **3951.** λ *Geminorum.* **Σ 1061.** Relatively fixed, but the stars have a common proper motion of 0″062 in 245°1 (Auwers).

1866.06	33°0	9″54	3*n*	Δ
1904.64	33.0	9.53	3*n*	β

[Ma (*F. S.* I) . . . Ma (**XI, XII, XIII, XV**) . . . Da^3. . . Bp . . . Ba (**III**) . . . Pk . . . Do (2196) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Δ (**II**) . . . En (2663) . . . β^6. . .]

11 30 **3953.** *Canis Majoris* 163. **Σ 1064.** Fixed.

1867.75	238°8	15″19	3*n*	Δ
1904.97	239.7	15.62	1*n*	β

[Ma (*F. S.* I) . . . Δ (**II**) . . . β^1. . . Cin^5. . . β^6. . .]

11 33 **3954.** **H 3945.** A is 5 m in Lalande and Heis. B = L 14202(7). The principal star is red, and suspected by Birmingham to be variable.

1898.20	60°3	27″12	3*n*	Doo	5–6. . .7
1902.36	60.6	27.3	2*n*	Innes	

[Innes (*Mon. Not.* **LXIII**, 76) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Birmingham (2375) . . . . Johnson (*Mon. Not.* **XLVIII**, 257) . . . . *Nature* **XXIII**, 591 . . . . Do (3798) . . .]

11 43 **3957.** **Weisse 15.** "Duplex" in W^2. I could not find any double in this place about 1875, and it was examined with the 40-inch in 1903. This star has no companion. It is closely following λ *Geminorum.*

11 49 **3960.** **H 416.** "By diagram the quadrant is *nf.*" Examined and estimated 85° (1875).

12 7 **3962.** **Σ 1051.** (AC = **S 545.**) There is no change in the position of the distant star. The angle of the close pair seems to be increasing. These stars have a proper motion of 0″059 in 250°3 (Bossert).

A and B

1855.32	269°0	1″19	1*n*	OΣ
1869.56	273.5	1.31	4*n*	Δ
1883.54	279.3	1.43	6*n*	En

A and C

1867.01	81°5	31″37	5*n*	Δ
1879.15	81.6	31.41	1*n*	Do
1881.28	81.9	31.47	1*n*	Big

[Ma (*F. S.* I) . . . Ma (**XI, XII, XV**) . . . H (**V**) . . . OΣ (**IX**) . . . Flm . . . Δ (2194) . . . Δ (**II**) . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Big . . .]

12 19 **3963.** **Brisbane 1523.** From H^8. B is O. Arg. S. 6553. No other measures.

12 32 **3965.** **Σ 1069.** Unchanged. B is SD (13°) 1925.

1867.73	194°2	25″10	3*n*	Δ

[En . . . Δ (**II**) . . .]

3966. **Σ 1067.** Unchanged. 12m 34s

1867.30	265°4	25″65	3*n*	Δ
1893.18	265.4	25.30	2*n*	Gla

[Ma (*F. S.* **II**) . . . Δ (**II**) . . . Glasenapp (**II**) . . .] (See p. 1069)

3967. **H 2372.** Nothing since Herschel except the following: 12 43

1901.84	2°8	22″39	2*n*	β^5	8.1. . .12.5

3968. **Ho 33.** No other measures except this: 12 51

1904.01	327°7	2″56	2*n*	β	8.6. . .10.3

[Ho (2778) . . . β^6. . .] (See p. 1069)

3969. **See 75.** Later measures are: 12 52

1899.15	7°3	12″42	2*n*	Cogshall

[See (*A. J.* 431) . . . Cogshall (*A. J.* 505) . . .]

3970. δ *Geminorum.* **Σ 1066.** (= **Ħ II. 27 = Sh 80.**) 12 57 Slow motion in angle; with distance constant. The companion has the same proper motion as the large star, 0″035 in 274°9 (Auwers).

1797.53	193°7	. . . . .	4*n*	Ħ
1854.73	202.3	6″99	13*n*	Δ
1867.56	201.9	7.27	4*n*	Δ
1873.78	204.2	7.07	2*n*	OΣ
1887.20	205.7	7.21	3*n*	Hl
1890.06	205.6	7.08	3*n*	Giacomelli
1899.86	206.4	7.16	4*n*	Doo
1904.54	208.0	6.96	3*n*	β

[Ma (324) . . . Ma (*F. S.* **I**) . . . Ma (**XI, XIII, XV**) . . . J^2. . . J^3. . . WJ^2. . . Fl . . . Da^1 . . . Bp . . . P^2. . . En . . . En (2663) . . . Ra (**XXIII**) . . . Se . . . Se^3. . . Wr (*Phil. Trans.* 1851) . . . Wn (**V**) . . . Wn (1738) . . . Δ (1026, 1110, 1256, 2194) . . . Δ (*Mem. Accad. Sci.*) . . . Δ (**I, II**) . . . WS . . . WS^2. . . Gl . . . Du . . . Sp (2133) . . . Sp (**II**) . . . Flm . . . Pk . . . . Sk . . . . Sk^2. . . . Sk^5. . . . Do (2196, 2199, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Jc (2346, 2449) . . . Per . . . OΣ (**IX**) . . . Hl (**I, II**) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LXII**, 383; **LXIV**, 794) . . . Glasenapp (**II**) . . . Maw (**I**) . . . Big . . . T (2866) . . . Collins (*A. J.* 378) . . . *Annals Toulouse Obsy.* **III** . . . Coleman (*Mem. R. A. S.* **LIII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . HΣ (**XII**) . . . Thiele (3837) . . . Giacomelli (**II**) . . . Biesbroeck . . . β^6. . .]

3971. **S 546.** B and C are DM (31°) 1541, and 1543. 13 4 Other stars between those measured. The only measures since 1825 are:

AB	1901.77	358°7	82″93	2*n*	β^5	8.5. . .8.6
AC	1901.77	68.0	144.04	2*n*	β^5	. . .8.6

3972. **Σ 1068.** Fixed. 13 4

1866.79	352°1	3″97	3*n*	Δ
1893.23	350.9	4.15	1*n*	Leip

[Ma (**XI**) . . . Ma (*F. S.* **I**) . . . Δ (**II**) . . . *A. G. Leipzig*, p. 208 . . .]

3973. 19 *Lyncis.* **Σ 1062.** (= **Ħ III. 83 = Sh 78.**) 13 4 Sh measures an 8 m star 213″35 distant; P = 87°7 *sf*, but it should be *np*, giving 356°7. A and B are relatively fixed, but common proper motion of 0″062 in 216°8 (*A. G. Hels.*).

1866.69	314°3	14″71	3*n*	Δ
1900.58	315.5	14.59	2*n*	Espin
1905.08	313.9	14.63	2*n*	β

The distant star is DM (55°) 1193:

1905.08	2°8	214″93	2*n*	β

[Ma (*F. S.* **I**)... Ma (**IX, X, XI, XIII**)... Wr... Ra (**XXII**) ... Δ (1026, 1256) ... Δ (*Mem. Accad. Sci.*)... Δ (**I, II**)... *Gr. Obsns.* 1840... Bl (**V**)... OΣ (**IX**)... *Annals Toulouse Obsy.* **III**... Espin (*Mon. Not.* **LXII**, 528)... β^{6}...]

13^{m} 5^{s} **3974.** 20 *Lyncis.* **Σ 1065.** (= **H N. 61** = **Sh 79.**) No change, but a common proper motion of 0″053 in 212°5 (Auwers).

1869.32	253°3	15″07	4*n*	Δ
1889.18	253.8	15.36	2*n*	Toulouse
1905.08	253.7	14.86	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XII, XIII, XV**)... Bes... Ek (**I**)... H (**V**)... Ra (**XXII**)... K... K (409)... Ba (**I**)... Lu (**I, II, III**)... *Gr. Obsns.* 1840... Auwers (1393)... Δ (1204) ... Δ (**I, II**) ... Gl ... Wh ... Bl (**V**)... Je (2346) ... Franz (2590)... Cohn (3240)... *Annals Toulouse Obsy* **III**... β^{6}...]

13 27 **3975.** **β 330.** Discovered with the 6-inch. Probably without change.

1878.12	211°7	1″22	1*n*	Cin
1886.84	213.5	1.25	1*n*	LM
1888.42	215.6	1.23	2*n*	Lv
1901.10	216.0	1.29	4*n*	Doo

[β (**VI**) ... β (2062) ... Δ (**I**)... Cin^{5}... Lv^{1}... LM ... Sp (**II**) ... Doolittle (*A. J.* 547)...]

13 28 **3976.** **Σ 1059** *rej.* The components are DM (69°) 422 and 420. (See p. 1069)

13 31 **3977.** **Σ 1070.** Perhaps a little advance in the angle.

1842.07	320°1	1″90	5*n*	Da
1869.16	323.3	1.76	2*n*	Δ
1895.27	325.2	1.96	2*n*	HΣ

[Ma (*F. S.* **I**)... Ma (**XI**)... Bp... Da^{3}... Ba (**II**)... Δ (1118)... Δ (**I, II**)... HΣ (**XII**)...]

13 41 **3979.** **Σ 1072** *rej.* The only measures are:

1898.20	107°4	22″19	3*n*	Doo	9 ...10
1904.00	108.7	21.94	2*n*	β	9.3...10

[Doolittle (*Pub. Flower Obsy.* **I**)... β^{6}...]

13 44 **3980.** 30 *Canis Majoris.* **H 3948.** One of the most beautiful fields in the heavens, with many stars near.

A and B

1880.20	90°0	7″84	2*n*	β	6.0...10.5
1898.25	89.3	8.59	2*n*	Doo	...10.5

A and C

1880.20	80°3	14″32	2*n*	β	...11.2
1898.25	85.6	14.56	2*n*	Doo	...11

A and D

1880.20	78°0	84″43	2*n*	β	... 8.7
1898.25	74.2	85.14	2*n*	Doo	... 8

There are several other stars nearer than D. The principal star is given a proper motion of 0″040 in 218°4 (*Cape Catalogue*).

[Cin^{3} ... Cin^{4} ... β^{3}... Doolittle (*Pub. Flower Obsy.* **I**)... Lunt (*Mon. Not.* **LXI**, 586)... Do (3798)...]

3981. **H 3949.** "Fine double star." In B. A. C. 6 m. H^{3} gives mags., 8...8. Apparently fixed. 13^{m} 54^{s}

1848.09	78°5	3″35	1*n*	J	
1876.36	76.3	3.37	4*n*	Cin	7.3...8.0
1903.16	77.1	2.98	2*n*	Scott	

[H^{3}.... J^{2}.... Cin^{3}.... Do (3378, 3799) (*Mon. Not.* **LXI**, 586).... Scott (*Mon. Not.* **LXIV**, 52)...]

3982. **Skinner 5.** Discovered by Skinner with the Meridian Circle at the Naval Observatory. Measures by β^{6}. Boeger (*A. J.* 522) measured a different pair on one night, which I could not find in this immediate vicinity. His measures are: 13 55

1900.27	356°9	6″59	1*n*
1900.32	291.8	2.56	1*n*

3984. **H 417.** This is H 756 where the larger star is called "*very red*"; companion 15 m. 13 59

1903.12	68°1	17″84	2*n*	β^{6}	8.6...11.2

[Espin (*Mon. Not.* **LXIV**, 678).. β^{6}...]

3986. 65 *Aurigae.* **β 901.** Discovered with the 18½-inch. Auwers assigns to this star a proper motion of 0″097 in the direction of 264°7. With the position of B in 1879, and this annual movement of A, the companion, if fixed in space, should be 17°1 : 11″12 for 1898. It is therefore very probable that it is moving with the principal star, while the more distant companion is fixed. 14 1

A and B

1881.29	8°5	11″06	1*n*	OΣ
1888.77	9.3	11.16	4*n*	HΣ
1891.18	9.1	11.14	3*n*	β
1898.08	7.5	10.90	2*n*	β

A and C

1898.08	30°3	37″76	2*n*	β

[β (**XIII**)... β^{3}... β (3114) (*Pub. L. O.* **II**)... OΣ (**X**)... HΣ (**XII**)...]

3987. **H 3950.** "Fine double star." In Lalande 7 m. Fixed. 14 12

1848.09	346°1	4″01	1*n*	J	8...8
1876.79	346.4	4.00	3*n*	Cin	8...8
1903.16	345.1	4.14	2*n*	Scott	

[WJ.... J^{2}.... Cin^{3}.... Cin^{4}.... Innes (*Mon. Not.* **LXI**, 586).... Scott (*Mon. Not.* **LXIV**, 52)....]

$14^m\ 20^s$ **3989.** **Ho 242.** Discovered with the 18½-inch. No other measures.

[Ho (2977)...] (See p. 1069)

14 21 **3990.** **Σ 1074.** (ACDE = **β 577.**) The distant star, D, was noted with the 18½-inch, and the fainter and nearer star, C, added with the 36-inch. The close pair is probably in slow motion, although there has been but little change in the last twenty years. Only a few of the measures of this are given. The complete observations will be found in the references given below.

AB and C

1899.08	97°9	12″42	3*n*	β
1899.26	101.2	12.92	1*n*	A

AB and D

1892.19	10°6	15″31	2*n*	β
1897.27	10.7	15.17	1*n*	A
1899.09	10.8	15.25	1*n*	β

AB and E

1897.27	278°2	54″08	1*n*	A

A and B (= Σ 1074)

1869.90	139°4	0″62	3*n*	OΣ
1882.89	141.5	0.64	6*n*	En
1888.73	139.6	0.82	3*n*	Lv
1892.18	142.7	0.55	3*n*	β
1895.19	137.4	0.58	2*n*	Lewis
1897.29	139.7	0.86	4*n*	A
1899.26	140.4	0.72	3*n*	A

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...H (**VII**)...OΣ (**IX**)...Δ (1474)...Δ (**II**)...Flm...Hd...Gl...Pt...Sk^3...Sk...Do (2307)...WS...Sp (**II**)...Sp (**II**, App)...β^1...Lv^1...En (2678)...Big (*Bul. Ast.* **XII**, 299)...Lewis (*Observatory* **XIX**, 118)....Biesbroeck....Hu (*A. J.* 427)...HΣ (**XII**)...β (**X**)...β^1...**β** (3141) (*Pub. L. O.* **II**)...A (*A. J.* 429) (3465, 3638)...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LVI**, 359; **LIX**, 400; **LX**, 499)...]

14 22 **3991.** **Σ 1071.** Slow rectilinear motion.

1829.73	357°3	15″52	2*n*	Σ
1867.30	5.0	15.86	3*n*	Δ
1874.29	7.7	16.18	1*n*	OΣ
1878.04	7.3	16.24	1*n*	β
1898.28	12.3	17.24	4*n*	Doo

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Δ (1800)...Δ (**II**)...Flm...OΣ (**IX**)...Big...β^1...Doolittle (*Pub. Flower Obsy.* I)...HΣ (**XII**)...]

(See p. 1069)

14 24 **3992.** **Σ 1073.** Fixed.

1868.76	67°3	8″71	4*n*	Δ

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...H (**VII**)...Δ (**II**)...Gl...]

(See p. 1069)

14 42 **3993.** **Σ 1076.** No motion.

1868.13	107°7	2″80	3*n*	Δ
1899.66	107.7	2.83	2*n*	Sk

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...H (**V**)...Gl...WS...WS^2...Sk^2...Δ (**II**)...Thiele (3837)...Sk^5...]

3994. **Σ 1077.** No. 5 of Schjellerup's list of new pairs. $14^m\ 52^s$ No motion.

1869.90	319°8	5″45	4*n*	Δ
1879.07	318.8	5.31	4*n*	Cin
1903.17	318.8	5.40	2*n*	β

There is a more distant companion, first noted with the 6-inch in 1875. The only measure is:

1903.17	240°5	21″24	2*n*	β	...12.2

[Ma (*F. S.* I)...Δ (**II**)...Cin^5...β^6...]

3994½. Measures by β^5. The principal star has a proper 14 52 motion of 0″075 in 263°9.

3995. **H 757.** The only measures are: 14 55

1903.12	108°1	5″48	2*n*	β^6	9.5...9.6

3996. **Hn 87.** (= **Innes 391.**) Discovered by Holden at 14 58 the Washburn Observatory. Innes mentions another companion, 30° : 5″.

1902.16	275°2	4″67	1*n*	Innes

[Hn (*Pub. Washburn Obsy.* **II**)....Com (*Pub. Washburn Obsy.* **VI**)....Innes (*Mon. Not.* **LXII**, 474; **LXIV**, 132)...]

3997. **A. G. 139.** Noted "duplex?" in *A. G. Berlin*, but 15 0 found to be single by Hussey (*Bul. L. O.* No. 44) and Miller (*A. J.* 546).

3998. **β 331.** Discovered with the 6-inch. It is *n* and a 15 2 little *f* 29 *Canis Majoris.* Probably without change.

1889.15	114°7	1″93	2*n*	Lv
1894.14	115.4	1.75	1*n*	Sellors

[β (**VI**)...β (2062)...Cin^4...Lv^1...Sellors (3303)...] (See p. 1069)

3999. **Ho 243.** This is called β 1024 by Lewis. 15 4

1899.22	164°5	2″38	1*n*	Lewis

[Ho (2977, 3558)...Lewis (*Mon. Not.* **LX**, 499)...] (See p. 1069)

4000. **Hn 88.** Comstock could not find this pair. It is 15 5 probably identical with Hn 87, which is 1° north.

[*Pub. Washburn Obsy.* **II, VI**...]

4001. **OΣ (App) 84.** These stars are Rad^1. 1942 and 15 21 1941. The only other measures are:

1904.52	325°1	113″67	2*n*	β

[Δ (I)...β^6...]

4003. **H 2373.** Espin (*Mon. Not.* LXII, 533) could not 15 27 find this pair. In 1904 I could not find it with the 40-inch. Probably an error in Herschel's place.

15^m 33^s **4004.** **β 1024.** Discovered with the 18½-inch. The following are all the later measures:

1901.08	96°.9	1″.34	3*n*	Doo
1904.18	99.4	1.34	2*n*	A

[β (**XIII**)...β^3 (App)...β (3141) (*Pub. L. O.* **II**)...Doolittle (*A. J.* 547)...]

15 55 **4007.** **Σ 1080.** Fixed.

1868.09	220°.7	22″.24	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...]
(See p. 1069)

16 · **4008.** **Lv 4.** From Lv^1. Place approximate. No other measures.

16 3 **4009.** **See 76.** Later measures are:

1899.88	216°.4	8″.49	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

16 22 **4011.** Noted with the 18½-inch. In the field with Σ 1079. The only other measure is:

1903.07	65°.0	2″.19	2*n*	β

[β^3...β^6...]

16 37 **4012.** **Σ 1075.** No motion.

1867.50	343°.9	7″.31	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]
(See p. 1069)

16 40 **4013.** **Σ 1079.** No change in the Σ pair. The pair of small stars in the field, CD, was discovered with the 18½-inch.

1867.10	331°.6	5″.43	3*n*	Δ
1903.12	331.6	5.67	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...β^6...]

17 1 **4016.** **Σ 1081.** En (1673) measures an 8.5 m star. 63°.8: 107″.20 (1865.73). Very little change in AB. The later measures seem to indicate that Σ's angle is too small.

1867.49	224°.5	1″.46	3*n*	Δ
1877.20	224.0	1.40	3*n*	Sp
1878.09	226.1	1.36	1*n*	β
1893.20	226.4	1.69	2*n*	Lewis
1896.08	226.2	1.48	2*n*	Collins
1898.06	224.0	1.32	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Se^3...Δ (1800)...Δ (**II**)...Sk^2...β^1...Do (2303)...En (1673)...Flm...Sp (**II**)...Lewis (*Mon. Not.* **LIV**, 314)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...HΣ (**XII**)...Sk^5...]

17 6 **4017.** **H 3291.** "The close star overlooked by Struve. A fourth *f.*" This is called Σ 1078 *rej.*, but that is stated by Σ to be the same as Σ 1088, the R. A. of the first being erroneous. (See p. 1070)

4019. **Σ 1082.** No change. The faint star, C, was added with the 18½-inch. 17^m 11^s

AB	1866.80	326°.4	19″.94	3*n*	Δ	
	1904.65	326.0	20.10	3*n*	β	
AC	1904.84	21.5	15.62	1*n*	β	...13.5

[Ma (*F. S.* **II**)...Δ (**II**)...β^3...*A. G. Leipzig*, p. 208...β^6...]

4025. **Ho —.** Discovered by Hough, but not included in his numbered lists of new stars. 17 27

[Ho (*A. J.* 215)...]

4026. **Ho 521.** No other measures. 17 30

[Ho (3557) (*A. J.* 215)...]

4033. **See 78.** Discovered at the Lowell Observatory. 18 2

AB	1900.00	290°.1	1″.62	3*n*	Cg
AC	1900.00	10.2	2.49	3*n*	Cg
AD	1900.00	30.5	6.94	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...Innes (*Mon. Not.* **LXI**, 587)...]

4034. **Σ 1084.** (= **H 423.**) *Yellow: purple* or *blue*, H. No material change. 18 3

1867.49	284°.7	13″.60	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...WS...Gl...Cin^5...Δ (**II**)...]

4035. **Hu 706.** The mean of the measures, including that in Part I, is: 18 4

1903.93	231°.6	0″.68	3*n*	Hu	9.1...9.2

[Hu (*Bul. L. O.* No. 65)...]

4036. **H 2377.** The only later observation is: 18 8

1900.13	260°.7	16″.73	2*n*	Espin (3717)

4038. **Σ 1083.** (= **H III. 48** = **H N. 95** = **H 422** = **S 547.**) Measures discordant, but no evidence of change. 18 30

1867.67	44°.9	6″.36	4*n*	Δ
1888.96	43.3	6.49	2*n*	T
1902.17	45.1	6.55	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII**)...H (**V**)...H^1...Bp...Da^1...Da^3...Se...Se^3...Wr...Ba (**II**)...Ra (**XXIII**)...Δ (**I, II**)...Δ (1118, 1256)...Pl...Per...Per (2684)...T (2991)...Glasenapp (**III**)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...*Annals Toulouse Obsy.* **III**...]

4039. **Σ 1085.** Without change. 18 31

1867.49	280°.3	3″.21	3*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)...Ma (**XI**)...Δ (**II**)...] (See p. 1070)

4041. **A. G. 140.** Double in *A. G. Berlin*. Measures by Cogshall (*A. J.* 546). 18 49

$18^m\ 53^s$ **4043.** **OΣ 171.** Very little if any change.

1871.27	127°6	1″06	3*n*	Δ
1890.91	130.9	1.13	3*n*	β
1898.22	129.3	1.05	3*n*	Hu

[Ma (**XI, XIII**)...Δ (I)...Sk^3...Big...β (3048)(*Pub. L. O.* **II**)...OΣ (**IX**)...Hu (*Pub. L. O.* **V**)...]

19 15 **4044.** **Schj. 5.** Noted as double by Schjellerup (1485). The components are SD (5°) 2104 and 2105.

1903.94	47°4	55″17	2*n*	β^6

19 15 **4045.** **Σ 1087 and 1088.** Without change.

AB	1867.08	195°6	11″17	3*n*	Δ
A^{1}B^1	1867.45	40.7	20.41	3*n*	Δ
AA^1	1866.65	238.0	112.25	5*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...*A. G. Leipzig*, p. 208...]

19 23 **4047.** **Σ 1089.** Without change.

1867.02	7°8	7″08	3*n*	Δ
1889.16	8.7	7.06	1*n*	Toulouse

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...*Annals Toulouse Obsy.* **III**...]

19 28 **4049.** **Σ 1090.** Without change.

AB	1867.36	97°6	60″73	3*n*	Δ
BC	1867.36	319.9	19.92	3*n*	Δ

[Ma (*F. S.* **II**)...H (**V**)...Δ (**II**)...]

19 51 **4051.** **H 3964.** Described by H as "chief of a cluster of the 8th class." The only measures are:

1889.13	348°8	4″19	2*n*	Lv
1897.82	346.8	4.74	1*n*	See

[Lv^1...See (3495)...]

19 55 **4052.** **β 758.** Discovered with the 6-inch. The magnitude in DM is 6.0. Unchanged. Lalande 14402. The later measures are:

1892.14	93°1	16″56	3*n*	β	6.0...11.1
1898.79	91.4	16.58	1*n*	β	6.7...11.0

[β (**XI**)...β^2...β (3141)(*Pub. L. O.* **II**)...En (2678)...]

19 57 **4053.** **β 199.** (AB = **Hd 104**; AC = **Ho 522.**) Discovered with the 6-inch. Probably fixed. The faint star discovered by Hough with the 18½-inch.

1889.12	21°6	1″84	4*n*	Lv
1893.19	23.1	1.74	2*n*	Sellors
1898.15	20.7	1.71	1*n*	Ho
1900.10	21.1	2.11	1*n*	Lunt

AB and C (= Ho 522)

1900.10	116°4	7″06	1*n*	Lunt

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Cin^4...Lv^1...Hd...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Sellors (3240)...Do (3378, 3798, 3799)...Ho (3557)...Lunt (*Mon. Not.* **LXI**, 587)...]

(See p. 1070)

4054. **Σ 1086.** Unchanged. $20^m\ 4^s$

1866.85	102°9	12″25	3*n*	Δ
1905.11	102.1	12.20	1*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)...Δ (**II**)...β^6...]

4056. **S 548.** (= **H V. 66** = **σ 261.**) *Orange: blue*, Webb. 20 31
There appears to be no change.

1872.19	276°5	35″68	1*n*	OΣ	
1901.54	276.3	35.30	2*n*	β	6.9...8.4

Espin measures a nearer star:

1892.18	23°9	11″31	1*n*	Es	
1901.54	19.1	11.45	2*n*	β	...12.2

[Kn....OΣ (**X**, p. 17)....Espin (*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n* **III**, 228)....β^5....]

4057. **A. G. 141.** Double in *A. G. Lund.* Measures by β^6. 20 32

1901.14	33°1	4″58	1*n*	Ku	10.0...10.1

[Kustner (3821)...]

4058. **Σ 1094.** (= **H N. 108.**) No measures by H. Unchanged. 20 36

1867.08	96°2	2″22	3*n*	Δ

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...]

4059. 63 *Geminorum.* **Sh 368.** (= **H V. 53.**) H made the distance, 44″25 (1785.00) 1*n*. The large star has some proper motion: 20 37

Bossert	0″118 in 200°8
A. G. Berlin	0.122 in 214.1

The only modern observations are:

1863.20	324°3	44″61	1*n*	Ra
1900.99	323.1	42.84	2*n*	β

[Ra (**XXIII**)...β^5...]

4060. **β 198.** (= **Hd 105.**) Discovered with the 6-inch. The larger star is red. Found independently at Cambridge. Without change. The 4″ pair of 8½ m stars 40^s *p* and 4′ *s* is H 3964. 20 38

1877.12	214°2	5″97	2*n*	Cin	8.0...10.5
1898.26	213.6	5.70	3*n*	A	8.0...10.8

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Hd...A (3584)...]

4061. **O. Stone 17.** Discovered at Cincinnati. 20 46

1877.04	77°8	4″61	2*n*	Δ	7.5...9.5

[Cin^4...Wilson (Cin^{10})...Δ (**I**, p. 378)...]

4062. **Σ 1091.** There may be a slight change in the angle. 20 48

1866.68	332°6	28″55	3*n*	Δ
1877.32	331.5	28.58	1*n*	OΣ
1891.32	330.7	28.90	2*n*	HΣ
1904.52	330.1	28.88	2*n*	β

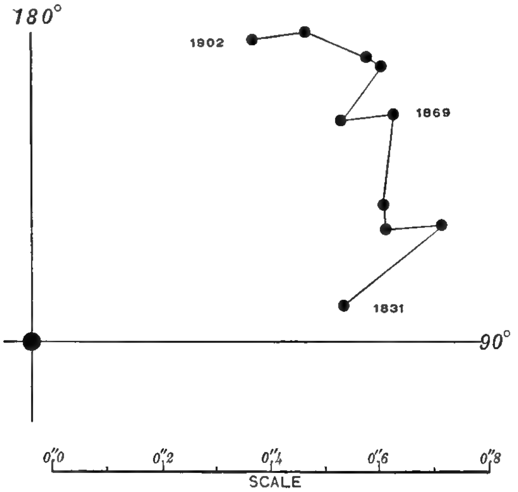
[Ma (*F. S.* **II**)...OΣ (**IX**) (**X**, p. 158)...Δ (**II**)...Oeltzen (880)...Flm...HΣ (**XII**) Sk^5...Espin (*Mon. Not.* **LXIV**, 676)...β^6...]

$20^m 51^s$ **4064.** **Σ 1095.** Unchanged.

1867.05	78°.1	9″.88	3*n*	Δ
1890.07	75.7	10.08	3*n*	T

[Ma (*F. S.* **I**)...H (**VII**)...Ma (**XI**)...Δ (**II**)...T (3185)...]

21 10 **4065.** **Σ 1093.** The angle and distance slowly increasing, and probably binary.



Σ 1093

The principal measures are:

1831.94	96°.4	0″.58	3*n*	Σ
1843.82	105.5	0.79	2*n*	OΣ
1848.62	107.3	0.69	3*n*	OΣ
1863.80	110.9	0.7 ±	3*n*	Δ
1869.31	121.8	0.79	1*n*	OΣ
1877.59	125.1	0.70	2*n*	Δ
1880.05	127.8	0.82	2*n*	Hl
1883.54	129.9	0.81	6*n*	En
1891.32	138.2	0.76	1*n*	HΣ
1902.71	143.5	0.69	2*n*	Hu

[Ma (*F. S.* **I**)...OΣ (**IX**) (**X**, p. 158)...H (**V**)...Ma (**X**)...Δ (1474) (**II**)...Hl (**II**)...β^3...Flm...En (2663)...HΣ (**XII**)...Sk^5...]

21 10 **4066.** **Hu 621.** Discovered by Hussey (*Bul. L. O.* No. 57.)

21 20 **4069.** **Σ 1092.** Probably unchanged.

1866.52	73°.0	2″.94	3*n*	Δ
1902.73	73.0	3.11	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

21 23 **4070.** **OΣ (App) 85.** No material change.

1895.52	25°.7	56″.84	4*n*	Franz

[Δ (**I**)...Franz (3464)...]

21 28 **4071.** **See 79.** Discovered at the Lowell Observatory.

1900.03	300°.2	0″.51	1*n*	Cogshall

[See (3495) (*A. J.* 431)...Cogshall (*A. J.* 505)...]

$21^m 34^s$ **4073.** **OΣ 172** *rej.* Description from *Poulkowa Catalogue* of 1843. Subsequently rejected by OΣ. Dembowski could not see the companion in 1865. The only measures are:

1878.16	245°.3	12″ ±	1*n*	β	
1898.26	247.1	14.75	3*n*	Doo	7.0...11.0
1899.17	248.7	14.99	3*n*	Hu	7.0...13.0

[Δ (I, p. 228)...β^1...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...]

21 35 **4074.** *η Canis Minoris.* **β 21.** Discovered with the 6-inch. Probably without change. The proper motion of the principal star is 0″.022 in the direction of 216°.7 (Auwers). If the small star was fixed in space, the movement would increase the distance 0″.5 in the time covered by the measures.

1877.23	22°.7	3″.79	1*n*	OΣ
1886.28	23.6	4.01	1*n*	HΣ
1891.96	25.8	3.99	3*n*	β
1898.12	24.3	4.33	2*n*	A
1898.25	28.2	4.04	2*n*	Lewis

[β^1...β (*Mon. Not.* **XXXIII**, 351)...β (3114) (*Pub. L. O.* **II**)...Δ (**I**)...OΣ (**X**) Lewis and Furner (*Mon. Not.* **LIV**, 794; **LIX**, 400)...A (3584)...HΣ (**XII**)...]

21 38 **4075.** *γ Canis Minoris.* **Lamont 4.** The measures given are from the Munich observations. The only other measures are:

1878.06	243°.2	32″.60	1*n*	β^1	
1901.65	241.8	31.32	3*n*	β^5	...13.0

The principal star has a proper motion of 0″.093 in 286°.9 (Auwers).

21 47 **4076.** **β 578.** Discovered with the 18½-inch. Very little, if any, change. The distance in my measure of 1878 is erroneously given in β^1 as 1″.72. This is a naked-eye star in *Argo;* SD 6.0 m.

1878.22	50°.6	2″.51	1*n*	Δ
1886.16	48.7	2.33	2*n*	W
1898.26	46.4	2.26	3*n*	A
1902.10	45.5	2.28	7*n*	Doo

[β (**X**)...β^1...Δ (I)...Cin^5...Wilson (Cin^{10})...A (3584)...Doolittle (*A. J.* 547)..]

22 14 **4080.** **β 332.** (AC = **Σ 1097.**) The duplicity of the principal star of Σ 1097 was discovered with the 6-inch. It was suspected by Δ when measuring the Σ star in 1865. Thus far there is no certain change in the close pair. The small star D is mentioned by H in his *Second Catalogue.* The Struve companion is certainly fixed. The 18½-inch shows a faint star about 12″ from C in the direction of 305°.

The principal star (B. A. C. 2470 = Lalande 14551) is a naked-eye star; Argelander and Heis 6 m, and placed in *Monoceros.* This star is variable 6.1 to 6.8 in about 14 days; discovered by Espin in 1883 (*Mon. Not.* XLIII, 432) (*Observatory* XI, 192).

A and B

1878.19	168°.2	0″.90	2*n*	Cin
1880.65	169.1	1.07	7*n*	Sp
1887.15	165.8	0.89	6*n*	T
1887.18	165.9	0.86	2*n*	Sp
1892.04	168.7	0.85	3*n*	β
1901.64	171.4	0.90	4*n*	Doo

AB and D

1892.10	157°8	23″32	2*n*	β
1899.05	156.8	23.08	1*n*	β

AB and E

1892.10	42°8	32″21	2*n*	β
1899.05	43.0	32.28	1*n*	β

AB and C (= Σ 1097)

1868.63	312°8	20″00	4*n*	Δ
1880.21	312.7	20.02	4*n*	Sp
1887.15	314.5	20.66	6*n*	T
1892.04	312.7	19.88	3*n*	β
1900.26	312.7	19.96	5*n*	Jouffray

[β (**VI**)...β (2062, 3141)...β^1...β (*Am. Jour. Sci.* April, 1875)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**).... Δ (**II**)....Sp (**II**, **II** App.)....Cin^5....T (2899)....Ma (*F. S.* **II**)...H (**II**, **VI**)...Ra (**XXIII**)...Doolittle (*A. J.* 547)...Jouffray (*Bul. Ast* **XXI**, 299)...]

22m 15s **4081.** **S 550.** The components are Lalande 14559 and 14560. The only measures since 1825 are:

1901.18	115°9	39″54	2*n*	β^5	6.8...7.1

22 15 **4082.** **Arg. 17.** "Duplex Cl. IV" in *O. Arg. S.*

(See p. 1070)

22 21 **4083.** 65 *Geminorum.* **β 1194.** Discovered with the 36-inch. The proper motion, from Auwers, is 0″034 in the direction of 238°3. The only later measures are:

1898.90	288°2	13″33	3*n*	A	5.0...14.2
1899.02	288.8	13.23	1*n*	β	...13.5

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (3584)...]

22 29 **4084.** **OΣ (App) 86.** B is DM (14°) 1676

[Δ (**I**)...]

22 46 **4088.** **Σ 1099.** Probably no motion.

1867.10	341°0	3″90	3*n*	Δ
1890.07	339.8	4.13	3*n*	T
1903.28	342.5	3.83	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Gl...Sp (**II**)...Δ (**II**)...T (3185)...*A. G. Leipzig*, p. 208...Biesbroeck...]

22 47 **4089.** **Σ 1096** *rej.* The only measure is:

1902.73	325°2	29″19	1*n*	Hu

22 50 **4091.** **A 3.** No other measures.

[A (3584, 3635)...]

22 54 **4092.** **H 2388.** In H (VII) 145°: 25″: 10...12.

23 11 **4094.** **Σ 1101.** No motion.

1868.14	89°1	6″17	3*n*	Δ
1901.18	88.7	6.42	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^5...]

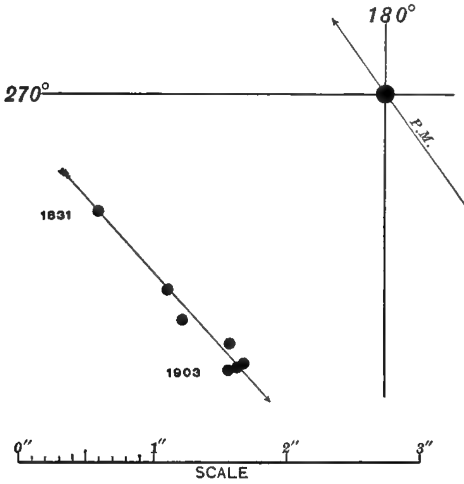
4097. **Σ 1102.** (= **S** 549.) Without change. South measures a 7 m star, 50°3 : 111″63 (1825.09). 23m 41s

1868.34	48°8	7″41	4*n*	Δ
1893.23	47.4	7.30	1*n*	Leip

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Δ (**II**)...*A. G. Leipzig*, p. 208...]

4098. **Σ 1104.** The components have nearly the same movement in space. The proper motion of A is, 0″312 in 216°1 (Porter). The apparent change is practically rectilinear to this time, and may be explained by the difference of the two proper motions. 23 55

1831.88	292°4	2″35	3*n*	Σ
1864.50	312.3	2.21	3*n*	Δ
1878.44	318.3	2.29	4*n*	Cin
1893.23	328.3	2.23	2*n*	Lewis
1899.87	330.6	2.40	4*n*	Doo
1901.13	331.9	2.35	2*n*	β
1903.14	332.4	2.31	5*n*	Jouffray



Σ 1104

The distant stars are not in Struve. The change shown by the later measures is due to the proper motion of A:

AC	1900.99	186°8	20″53	2*n*	β	...11.7
AD	1900.99	5.7	38.08	2*n*	β	...11.6

[Ma (*F. S.* **I**)...Δ (1572)...Δ (**II**)...Se^2...Pt. .Sk...Sk^3...WS...Gl...Cin^5... Wilson (Cin^{10})... Hd... Flm... En (2663)...Lewis (*Mon. Not.* **LIV**, 314)... Glasenapp (**II**)...Do (3378, 3798, 3799)...Solá (3563)...Doolittle (*Pub. Flower Obsy.* **I**)....*Annals Toulouse Obsy.* **III**....Lunt (*Mon. Not.* **LXI**, 587; **LXII**, 472)...Scott (*Mon. Not.* **LXIV**, 52)...Jouffray (*Bul. Ast.* **XXI**, 299)...β^5...]

4099. **Ho 34.** No other measures. 24 8

[Ho (2778, 3234)...]

(See p. 1070)

4100. **Σ 1103.** (= **S** 551.) Relatively fixed. 24 11

1866.47	243°6	4″23	3*n*	Δ
1893.18	245.0	4.53	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)... H (**V**)... Δ (**II**)... Cin^6...T (3185)...Glasenapp (**II**) ...*A. G. Leipzig*, p. 247...]

24m 27s **4103.** **Σ 1098.** No change.

1868.80	284°.1	26″.75	4*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

24 29 **4104.** **Σ 1106.** Without change.

1868.35	32°.6	10″.43	3*n*	Δ

[Ma(*F. S.* **I**)...Ma(**XI**)...H (**VI**)...Δ (**II**)...]

25 11 **4106.** **H** 760. H says "the small star a *minimum visibile*." Probably error in the magnitude of A, as it is 7.5m in DM, and 8 in L. The only measures are:

1878.07	355°.3	29″.92	1*n*	β1	
1903.17	356.0	30.33	2*n*	β6	7.0...13.0

25 30 **4108.** **β 22.** Discovered with the 6-inch. Fixed.

1880.68	151°.7	6″.14	4*n*	β
1890.91	150.4	6.42	3*n*	β

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Δ (**I**)...β (3048)(*Pub. L. O.* **II**)...]
(See p. 1070)

25 39 **4109.** **Σ 1108.** Unchanged.

1866.67	180°.0	11″.55	3*n*	Δ
1899.17	178.5	11.47	3*n*	Coleman

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... β3... Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

25 47 **4111.** **Σ 1109.** Fixed. Σ speaks of a third star, 11m, 303°.6:27″.07.

AB	1869.68	15°.1	3″.07	4*n*	Δ
AC	1868.22	307.4	27.19	1*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XIII**)...Hd...Gl...Δ (**II**)...]

25 56 **4112.** **See 80.** No other observations.

[See (*A. J.* 431)...]

26 0 **4113.** **Σ 1111.** Fixed.

1868.18	219°.6	19″.77	4*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...]

26 21 **4118.** **Σ 1112** *rej.* From H (V). The principal star, L 14706, has a considerable proper motion:

Rad3.	0″.167 in 206°.3
Porter	0.188 in 217.3

No measures except the following:

1905.11	112°.1	23″.31	1*n*	β6	7.8...10.5

4119. **H 3973.** "*Pure white : remarkable brick red.*" Not in *O. Arg. S.* Appeared to me brighter than 9m on one occasion in 1876. This is See 81. 26m 37s

1899.02	37°.2	8″.91	3*n*	Boothroyd	7.5...8.3
1902.05	38.2	8.82	2*n*	β	8.4...9.3

[See (*A. J.* 431)...Boothroyd (*A. J.* 505)...β5...]

4120. **β 579.** (ACD = **OΣ** 173 *rej.*) The duplicity of the principal star of OΣ 173 *rej.* was suspected with the 6-inch in 1875, and verified subsequently with the 18½-inch. The OΣ pair was rejected in the second edition of the *Poulkowa Catalogue* by reason of the distance of the companions. No evidence of change in any of the stars. 26 40

A and B

1886.31	219°.6	1″.07	1*n*	HΣ
1890.90	213.9	0.90	3*n*	β
1898.11	214.2	1.12	1*n*	Doo
1898.24	230.0	1.07	1*n*	Lewis
1899.28	219.7	1.07	2*n*	Hu

A and C (= OΣ 173 *rej.*)

1843.27	234°.1	18″.86	1*n*	Ma
1869.76	233.6	18.23	1*n*	Δ
1880.15	234.0	18.94	2*n*	β
1886.31	233.0	19.11	1*n*	HΣ
1898.11	233.1	18.52	2*n*	Doo
1899.08	234.6	18.94	1*n*	β

A and D

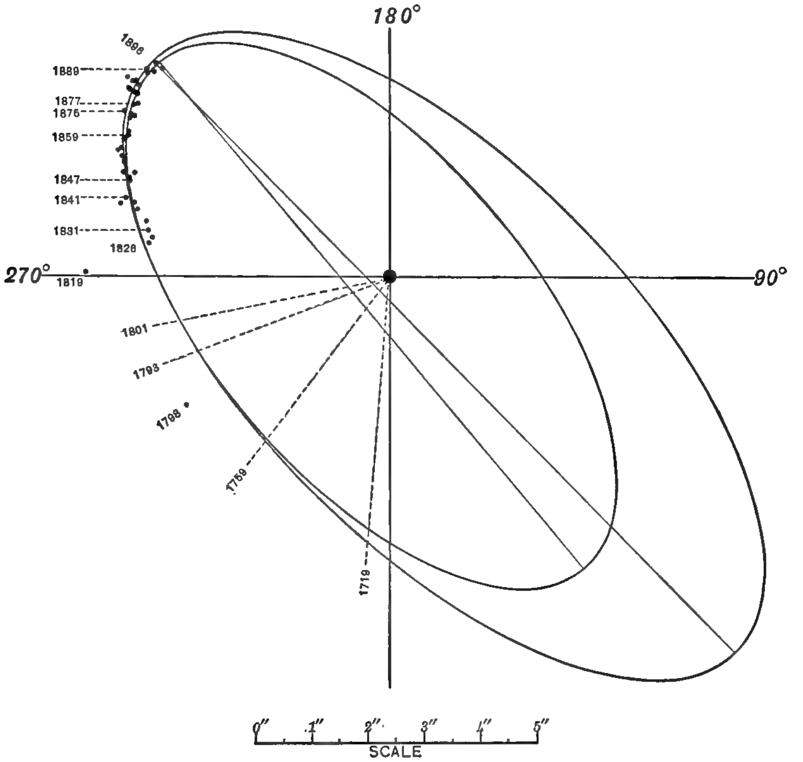
1880.15	349°.7	43″.06	1*n*	β
1886.31	347.7	43.41	1*n*	HΣ
1898.11	347.7	43.44	2*n*	Doo
1899.08	348.7	43.80	1*n*	β

[β (**X**)...β1...β3...β (3048) ... β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Δ (**I**, p. 157) ...Doolittle (*Pub. Flower Obsy.* **I**) ... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 499; **LXII**, 383)...Ma (**XI**)...HΣ (**XII**)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

4122. *a Geminorum.* **Castor.** **Σ 1110.** (= **H II. 1** = **Sh 81**; AC = **Σ 4, App. II.**) A brilliant pair, too well known to call for any detailed description here. It is a binary in very slow retrograde motion. The period, and all other details of the orbit, are wholly unknown. The total arc described since the first measures which have any certain value in an investigation of this kind is less than 40°. The measures before 1826 are only rough and uncertain position-angles, and any use made of them must of necessity lead to an erroneous result. I have heretofore shown (*Popular Astronomy* IV, 386) that the problem of finding the elements of the orbit is absolutely indeterminate at this time, and likely to remain so for another century or longer. The diagram used there is reproduced here to show the character and extent of the relative motion, and its insufficiency in point of time for the prediction of the future situation of the components. The two ellipses shown give periods which differ by more than two hundred years, but so far as the observed positions are concerned they are practically identical. 26 57

This system has been a favorite subject for computers for the last three-quarters of a century, and doubtless will continue to be in spite of the fact that there is a difference of seven or eight hundred years in the periods found from practically the same data. The following orbits have been published, the date of the last measure used being given in the first column:

1831	Herschel	252.66 yrs.	*Mem. R. A. S.* **V**, 196
1841	Madler	232.12	*A. N.* 452..Ma (**IX**)
1845	Hind	632.27	*A. N.* 551
1847	Madler	519.77	*F. S.* I, 233...Ma (**XV**)
1846	Jacob	653.1	*Mem. R. A. S.* **XVI**
1856	Thiele	996.85	*A. N.* 1227
1875	Wilson	982.9	*Handbook of Double Stars*, p. 106
1877	Doberck	1001.21	*A. N.* 2168
1878	Thiele	720.	"*Castor*," Copenhagen, 1879
1889	Mann	265.7	*Sid. Mess.* **IX**, 385
1896	Burnham	Indeterminate	*Pop. Ast.* **IV**, 386
1898	Doberck	318.23	*A. N.* 3525
1904	Doberck	268.16 346.82 501.08	*A. N.* 3970



Castor

A vast number of unnecessary measures have been made of this pair. A few of the positions are:

1831.31	259°6	4″46	5*n*	Σ
1838.34	254.4	4.81	3*n*	Σ
1847.93	249.7	5.06	6*n*	OΣ
1857.06	244.6	5.40	9*n*	OΣ
1869.01	238.4	5.55	7*n*	OΣ
1876.77	235.9	5.54	13*n*	Δ
1891.24	229.6	5.81	6*n*	Hl
1898.84	226.3	5.70	3*n*	Hu
1903.64	224.3	5.72	7*n*	Biesbroeck

B is a spectroscopic binary, discovered by Belopolsky at the Poulkowa Observatory (*Astrophysical Jour.* V, 1); and very recently (1904) Curtis at the Lick Observatory has found that A is also a double of this class (*Pub. A. S. P.* XVI, 261).

The system has a proper motion of 0″207 in 247°6 (Auwers). The distant star, C, is moving with AB.

1835.24	162°5	72″54	7*n*	Σ
1862.87	163.5	72.73	5*n*	Δ
1891.25	163.9	72.93	4*n*	Hl
1899.21	164.2	73.09	5*n*	Coleman

[Ma (*F. S.* **I**, 233)...Ma (430, 324, 452, 317, 413)...Ma (**IX, X, XI, XIII, XV**)...BM (280)...Bes...Σ1...Ek (**I, III**)...Mu...Bp...Da1...Da2...Da3...Da4...H (*Mem. R. A. S.* **V**, 196)...H1...H2...H (**VII**)...J2...J3...WJ...WJ2...P1...P2...Fl...Wr...Thiele (1227)...Se (*Comp. Rend.* **XLI**, 271)...Se...Se3...Se (975)...Schmidt (1543)...Peters (1042)...Auwers (1393)...En (1518, 1673)...Wn (**V**)...Wn (1738)...K...K (409, 1519)...Lu (**I, II, III**)...Lu (1103)...Ba (**I, II, III, IV**)...Miller (790)...Hind (551)...Bru...Hind (*Mon. Not.* **VII**, 23; **XXXIII**, 100)....Burton (*Mon. Not.* **XXXIV**, 125)....Ra (**XXI, XXII, XXIII, XXIV, XXX, XXXI, XXXIV, XXXV, XXXVIII**)...Hd...WS...WS2...Gl...Ferr...Du...Sp (2133) (**I, II**)...Waldo (2190)...Wh...Bond (*Am. Acad.* **II**, 144)...Da (*Mem. R. A. S.* **V**, 139)...*Durham Obsns.* 1846–48...Pogson (*Brit. Assn. Rep.* 1858)...Flm...Bru2...Pl...Pk...Sk...Sk2...Sk3 Kustner (2584)...Franz (2590)...Pt...Δ (*Mem. Accad. Sci.*)...Δ (1026, 1110, 1256, 1474, 1575, 1735, 1886, 2077, 2192)....Δ (**I**) (**II**, 192, 589)....OΣ (**IX**) (**X**, pp. 70, 158)...Thiele (*Castor: Calcul du mouvement relatif*, Copenhagen, 1879)...Wilson (*Handbook of Double Stars*, p. 106)...Do (2168, 2197, 2199, 2433, 2989, 3378, 3525, 3680, 3798, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) (*Observatory* **II**, 214)...Je (2346, 2449)...Per...Per (2684)...Goldney (2257) β2....β (*Mon. Not.* **LI**, 391)....En (2663, 2742, 2786)....Engelhardt (**II**)....T (2866)...Big...Com (**VI, X**)...Perry (*Eng. Mech.* **XXXIX**, 11)...Mann (*Sid. Mess.* **IX**, 385)...Hayn (3051)...Hl (*A. J.* 265)...Hl (*Wash. Obsns.* 1880–86)...Hl (**I, II**)...Wilson (*Mon. Not.* **XXXII**, 266, 341; **XXIII**, 71)...T (3185)...Johnson (*Rad. Obsns.* **XVI**, 20)...Maw (**I**)...Knorre (*Beob. Berlin* **VI**, 1892)...Lv1...Lv (*A. J.* 278)...*Proc. Haverford Coll. Obsy.* 1892–93...Jones (*A. J.* 312)...Glasenapp (**II III, IV, V**)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Hagen (3258)...Sk4...Sk5...Collins (*A. J.* 378)...Knorre (3300)...Giacomelli (**II**)...β (*Pop. Ast.* **IV**, 386)...Scott (*Brit. Ast. Ass'n* **VIII**, 66)...Hu (*A. J.* 427)...Morgan (*A. J.* 439)...Doolittle (*Pub. Flower Obsy.* **I**)....Gl (*Mon. Not.* **LXI**, 556)....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)...Je (3802)...*Annals Roy. Obsy. Edinburgh* **I**, p. 188)...Gore (*Mon. Not.* **LXIII**, 171)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LVI**, 359; **LIX**, 400; **LX**, 499, 518; **LXI**, 490; **LXII**, 383; **LXIII**, 403; **LXIV**, 794)...]

$26^m\ 59^s$ **4123.** **Σ 1115.** Fixed.

1868.39	138°8	12″36	3*n*	Δ
1902.05	140.0	12.23	2*n*	β

[Ma (*F. S.* **I**)...H (**VIII**)...Δ (1736)...Δ (**I, II**)...β^6...]

27 8 **4125.** **Σ 1114.** No change.

1867.76	56°0	6″46	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H (**VII**)...WS...Gl...Δ (**II**)...]

27 17 **4126.** **Hu 707.** The mean of the measure in Part I and a later one is:

1903.50	19°0	2″47	2*n*	Hu	8.6...12.0

[Hu (*Bul. L. O.* No. 65)...]

27 18 **4127.** **Ma 2.** From list of new pairs in Ma (XI). In the field with OΣ 174.

1905.11	118°8	3″40	1*n*	β^6

27 20 **4128.** **Δ 13.** Discovered by Dembowski; near Σ 1115. In measuring this with the 40-inch, a much nearer star was detected. The only later position of AC is:

1902.05	288°2	11″81	2*n*	β	...9.7

[Δ (**I**, p. 374)...β^5...]

27 30 **4129.** **OΣ 174.** Probably unchanged.

1869.02	82°8	1″88	5*n*	Δ
1898.15	84.9	2.13	3*n*	Hu

[Ma (**XI, XIII**)...Du...Big...Δ (**I**)...OΣ (**IX**)...Knorre (3300)...Ebell (3321) Hu (*Pub. L. O.* **V**)...]

27 31 **4130.** **OΣ 175.** There is no change in the angle, and probably none in the distance. Glasenapp measures a distant star, 195°5 : 81″10 (1893.19) 2*n*.

1869.50	331°3	0″85	1*n*	Δ
1883.48	332.2	0.88	7*n*	En
1888.24	334.1	0.71	3*n*	Hl
1898.09	328.7	0.82	3*n*	Hu
1903.16	330.1	0.55	3*n*	Bowyer

The close pair has a proper motion of 0″046 in 294° (Auwers).

[ΘΣ (**IX**) (**X**, p. 193)...Ma (**XI, XIII**)...Da^3...Knott (*Ast. Reg.* June, 1864)...Burton (*Copernicus* **I**, 54)...Hl (*Wash. Obsns.* 1880)...Per...Per (2684)...Hl (**I, II**)...β^1...T (2866)...En (2678)...Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 499; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 793)....Glasenapp (**II**)....Big (*Bul. Ast.* **XII**, 299)....Hu (*A. J.* 397)....Coleman (*Mem. R. A. S.* **LIII**)...Maw (**III**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

27 51 **4135.** **Σ 1116.** Without change.

1866.43	109°9	1″82	3*n*	Δ
1890.08	107.4	1.80	3*n*	T

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^2...Se...Se^2...Se^3...OΣ (**IX**)...Du...Δ (1118)...Δ (**I, II**)...T (3185)...Knorre (3518)...*A. G. Leipzig*, p. 208...]

4136. **Hu 622.** No other measures. $27^m\ 59^s$

[Hu (*Bul. L. O.* No. 57)...]

4139. **H 56.** I have identified this star as SD (2°) 2181. Lunt measures a pair, undoubtedly the same, which is called SD (2°) 2180. This is 8.3 *p* and 2′5 *s* of 2181. The measures are: 28 19

1900.17	148°5	7″54	1*n*	Lunt	
1903.03	328.2	7.33	2*n*	β	9.3...9.3

[Lunt (*Mon. Not.* **LXI**, 587)...β^6...]

4142. **Σ 1117.** Without change. 28 49

1867.76	227°8	11″39	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

4143. **Howe 18.** Discovered by Howe at Cincinnati. 28 56

1900.10	204°4	1″85	1*n*	Lunt

[Cin^4...Wilson (Cin^{10})...Lunt (*Mon. Not.* **LXI**, 587)...]

4147. *n^1, n^2 Puppis.* **S 552.** (= **H N. 19.**) Fixed. S greatly underrated magnitudes; in B. A. C. 4½ and 6. As a naked-eye star, Heis rates it 5 m. H and J make the stars equal. 29 15

1878.60	108°1	9″05	2*n*	Cin
1897.82	108.6	9.37	1*n*	See

[H^3...P^1...J^2...WJ^2...Dun...Se...Se^3...Ra (**XXIII, XXXIX**)...Cin^4...Cin^5...Wilson (Cin^{10})...See (3495)...Do (3798)...]

4148. **Σ 1118** *rej.* The only measure is: 29 18

1904.95	16°3	23″70	1*n*	Hu

(See No. 13137)

4149. **Σ 1107.** Change uncertain. 29 25

1867.45	208°1	1″37	3*n*	Δ
1899.32	202.6	1.30	1*n*	Brown

[Ma (*F. S.* **I**)...Δ (1572)...Δ (**I**)...Flm...Brown (3645)...]

4150. **Schj. 6.** The companion is SD (5°) 2176. The only measure is: 29 32

1905.12	179°2	71″10	1*n*	β

[Schj (1485)...β^6...]

4155. **H 2399.** The only measures are: 29 57

1900.01	66°1	12″26	2*n*	Espin

[Espin (*Mon. Not.* **LXII**, 532)...]

4156. **See 83.** Later measures are: 30 10

1899.14	202°7	8″94	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

30m 29s **4159.** **OΣ (App) 87.** Probably unchanged.

1900.10	178°0	65″10	2*n*	Espin

[Δ (I)...Franz (3080)...Espin (*Mon. Not.* **LXIV**, 678)...]

30 32 **4162.** **Σ 1120.** (= **S** 554.) No change.

1868.87	35°9	19″73	4*n*	Δ
1884.09	36.3	19.59	1*n*	Wilson

[Ma (*F. S.* **I**) ... Se1 ... Ma (**XI**) ... Cin6 ... Wilson (Cin10) ... Δ (**II**) ... *Annals Toulouse Obsy.* **III**...]

30 34 **4163.** **H 3982.** The description in H is "coarsely triple," and his R. A. is uncertain to 5m. Identified, and correct place given. It is 6 m. in Heis and Arg. U. N. Both companions are *sf*, and are Cord. DM (27°) 4567 (9.8) and 4569 (10).

30 40 **4164.** 70 *Geminorum.* **β 200.** (ABC = **H VI. 70.**) The distant stars, B and C, were noted by H, and given without measures. The duplicity of C was discovered with the 6-inch. Auwers gives the proper motion of A, 0″029 in the direction of 35°5.

		C and D		
1880.11	241°8	1″42	3*n*	β
1892.06	242.2	1.74	3*n*	β
1898.96	244.2	1.82	1*n*	β
		C and E		
1892.10	203°3	17″48	2*n*	β
1898.96	207.2	17.74	1*n*	β
		A and B		
1892.04	190°0	98″94	2*n*	β
1898.79	190.6	99.23	2*n*	β
		A and C		
1880.15	100°7	160″47	2*n*	β
1892.04	98.5	161.46	2*n*	β
1898.79	98.8	160.66	2*n*	β

[β (**IV**) .... β (*Mon. Not.* **XXXIV**, 382) .... β3 .... β (3114) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) .... Δ (**I**) ....]

(See p. 1070)

4165. **Σ 1119.** Without change.

1869.50	348°7	2″77	4*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Hd ... Δ (**II**) ...]

31 5 **4168.** **H 5470.** "In Cluster VII. 28; is not Σ 1120."

31 5 **4169.** **Σ 1121.** (= **H II.** 63 = **S** 553.) Without change.

1867.48	305°0	7″40	3*n*	Δ
1893.18	304.3	7.03	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI**) ... Bp ... P1 ... WJ ... Da3 ... Se ... Se3 ... J2 ... H (**VIII**) ... Ba (**II, III**) ... Ra (**XXIII, XXV**) ... Ferr ... Cin4 ... Cin6 ... Wilson (Cin10) ... Δ (1118) ... Δ (**I, II**) ... T (2898) ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III**...]

31 10 **4170.** **S 555.** Nothing since 1825 but the following:

1901.71	228°3	95″75	2*n*	β6	7.5...7.7

4171. **H 2404.** H notes "a third seen." H (VI) 71°5: 12″± with R. A. 1m less. This is not in DM. A 13.5 m star, 58°9 : 42″9. 31m 17s

		A and B			
1903.72	61°7	14″26	2*n*	β6	9.1...11.0
		A and DM (18°) 1692			
1903.72	188°6	50″09	1*n*	β6	... 9.0

4172. **Ho 35.** Discovered by Hough with the 18½-inch. No other measures. 31 24

[Ho (2778)...]

4173. **Ho 244.** Discovered with the 18½-inch. Two distant companions, one 13 m, 195°: 34″, and the other 9 m, 109°: 69″. 31 25

[Ho (2977)...] (See p. 1070)

4174. **H 3983.** "Chief of a large fine cluster." 31 35

4180. **S 557.** No recent measures except: 32 7

1902.50	337°7	65″51	2*n*	β6	7.4...8.6

4181. **OΣ 176.** No material change. 32 20

1869.93	213°4	1″64	5*n*	Δ
1884.06	211.9	1.61	3*n*	Per
1898.15	210.1	1.41	3*n*	Hu

Ma (**XI, XIII**) ... Per ... Per (2684) ... Δ (**I**) ... OΣ (**IX**) ... Lewis (*Mon. Not.* **LIV**, 314; **LX**, 499; **LXI**, 486) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ...]

4183. **H 765.** The principal star has a proper motion of 0″163 in 181°9 (Porter). The only measures are: 32 30

AB	1901.77	212°5	23″55	2*n*	β5	8.6...11.0
AC	1901.77	296.5	40.69	2*n*	β5	...11.0

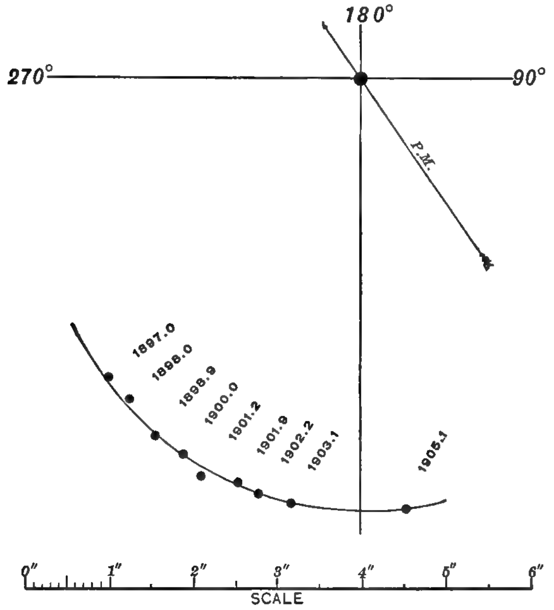
4184. **Ho 245.** Discovered by Ho (2977). Two distant 9 m companions, 98°: 50″±, and 155°: 60″±. 32 38

(See p. 1070)

4186. 24 *Lyncis.* **H 2405.** The large star has a small proper motion, 0″077 in 217°7 (Auwers). The only measures are: 32 51

1901.82	319°5	54″68	2*n*	β6	...9.5

4187. α *Canis Minoris.* **Procyon.** From the apparent variable proper motion of Procyon, the existence of a physical companion, like that of Sirius, was long ago suspected, and its position with reference to the large star computed in 1861 by Auwers. He deduced a period of 39.98 years for the hypothetical star, based upon the meridian observations. In March, 1873, OΣ detected what he supposed to be a faint companion 33 1 within a few degrees in position-angle of where it should have been at that time in accordance with the theory of the disturbing body. Its position on the night of discovery was measured, 87°.4: 11″.68 (1873.21). It was measured on several nights within the month, and again in the following year (1874), when it was confirmed and measured by at least one other observer (*Mon. Not.* XXXIII, 430; XXXIV, 335). It was carefully looked for on several nights in 1874 by the Washington observers with the 26-inch refractor, but was always invisible in that instrument under the best conditions. Procyon was examined on many nights by me with the Chicago 18½-inch, both before and after the announcement of the Struve companion, but at no time was any star seen or suspected nearer than the Lamont companion, which at that time was 45″ distant.



Procyon. AB

In 1876 the Washington observers, while examining Procyon for the OΣ companion, found several other companions in the first quadrant, with distances from 6″ to 10″. These were approximately measured by Holden, Watson, and Peters (*A. N.* 2080), and the existence of three of them considered well established.

It is certain now that all of these stars, as well as the Struve companion, were optical illusions, and have no real existence. They have never been seen since with much larger telescopes, and in fact it has been conceded by the observers themselves that they were mistaken in these observations.

In 1868 it was noted at the Harvard College Observatory "two faint companions suspected with power 401, one about 7″ *n*, the other about as far *f*; nothing visible with power 316," and again suspected four days later (= Hd 108). It appears to have received no further attention.

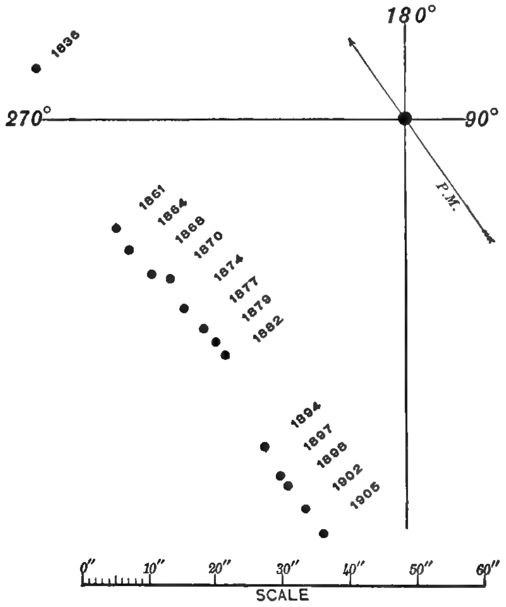
On many occasions, and particularly in 1888 and 1890, I examined Procyon with the 36-inch at Mt. Hamilton, but was never able at any time to see any trace of a near star. It remained for Schaeberle, in the latter part of 1896, to discover with the same telescope the real, long sought companion.

The following are all the measures of this star:

A and B

1896.93	320°.4	4″.63	4*n*	Schaeberle
1897.00	321.1	4.83	4*n*	A
1897.16	319.8	4.65	3*n*	Hu
1897.82	324.4	4.66	6*n*	Schaeberle
1897.83	327.4	4.80	1*n*	See
1897.83	328.6	4.82	1*n*	Boothroyd
1897.88	323.8	4.70	3*n*	A
1898.21	325.3	4.82	2*n*	A
1898.21	326.0	4.83	6*n*	Barnard
1898.24	326.0	4.26	1*n*	Lewis
1898.28	325.0	4.50	1*n*	Hu
1898.76	330.9	4.97	3*n*	A
1899.07	330.6	4.91	3*n*	Barnard
1899.96	334.5	4.88	3*n*	A
1900.05	336.0	5.09	6*n*	Barnard
1900.23	338.3	4.83	1*n*	Lewis
1900.29	332.4	4.60	4*n*	See
1901.20	338.5	5.13	2*n*	A
1901.88	343.5	5.06	2*n*	Barnard
1902.21	344.9	5.39	2*n*	Lewis
1902.24	346.5	5.11	1*n*	Hu
1903.15	351.0	5.16	3*n*	Barnard
1905.14	6.2	5.14	1*n*	A

The results of the measures made with the large refractors of the Lick and Yerkes observatories are shown on the diagram.



Procyon. A C

From a discussion of the measures of the companion, and the observations relating to the variable proper motion, See finds a period of 40.0 years.

The distant companion was first noted by Lamont in 1836, and many years later independently by Dawes (= Da 7). The change in the position of this is wholly due to the proper motion of Procyon, which is 1″.245 in 215°.0 (Auwers). Some of the measures are the following:

A and C

1836.7	262°.3	56″.59	1*n*	Lamont
1861.20	291.8	46.88	1*n*	OΣ
1864.26	296.4	46.58	1*n*	OΣ
1868.27	302.4	45.15	1*n*	OΣ
1870.25	305.2	43.51	1*n*	OΣ
1874.00	311.8	44.59	1*n*	Newcomb
1877.88	317.3	44.62	2*n*	β
1879.69	320.7	44.77	4*n*	β
1882.20	323.6	45.37	3*n*	β
1894.48	337.3	54.20	7*n*	Barnard
1897.88	341.2	57.40	1*n*	β
1898.96	342.4	58.48	13*n*	Barnard
1902.02	345.9	60.96	2*n*	Barnard
1905.16	348.8	63.38	2*n*	β

Several very distant stars following, the nearest being the close double discovered by Bird, have been connected with *Procyon* by direct measures:

1874.67	81°.1	342″.81	4*n*	Δ

OΣ has a long series of observations of the same star, giving differences of R. A. and Decl.

[Mu.... Da (*Mon. Not.* **XXIV**, 117, 143).... Romberg (*Mon. Not.* **XXIV**, 196).... Lassell (*Mon. Not.* **XXIV**, 207) ... P... P^1... Wr... Se^3... Newcomb (*Wash. Obsns.* 1874).... Hl (I).... Washington observers (2080) .... Hn (*Proc. Am. Acad.* 1876, **XI**, 185) ... Bes (*Mon. Not.* **VI**, 136) ... Ma (750)... Pk... Hd... Auwers (1371, 1411–1416) (*Roy. Acad. Sci.* Berlin, May, 1873) (*Mon. Not.* **XXII**, 150; **XXXIV**, 25)... Lu (**II, III**)... OΣ (*Mon. Not.* **XXXIII**, 430; **XXXIV**, 335) (*Mélanges Math. et Astron.* **V**)... OΣ (**X**, p. 72) ... Sadler (*Mon. Not.* **XXXIX**, 188) ... Δ (I, p. 379) ... β^1... β^3 ... β (2875, 3048) (*Pub. L. O.* **II**)... Flm... L. Struve (*Mem. Acad. St. Petersburg*, **XXXI**, No. 2)... β^5... β (*Ast. and A.-P.* **XII**, 434)... β^6...]

The following relate to the Schaeberle companion:

[Schaeberle (3390, 3410) (*A. J.* 389, 394, 416, 420) (*Pub. A. S. P.* **IX**, 244)... A (3465, 3584, 3638) (*A. J.* 394, 424, 429) (*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XI**, 46; **XII**, 31) ... Hu (*A. J.* 403, 427) (*Bul. L. O.* No. 44) ... See (3496, 3654) (*A. J.* 440 orbit)... Barnard (*A. J.* 435, 447, 462, 482, 541) ... Lewis (*Mon. Not.* **LIX**, 400; **LXI**, 490; **LXIII**, 403)...]

$33^m\ 24^s$ **4188.** **Bird 2.** In the field closely *f Procyon;* discovered by Frederick Bird in 1864 with a 12-inch mirror. It was found independently later by Dembowski. This star has frequently been connected by micrometrical measures with *Procyon*, as referred to in the note to that star. The discovery of the close pair is erroneously credited by OΣ to Δ, and by Hl to G. Anderson at the Washington Observatory. Motion doubtful.

1880.39	189°.5	0″.82	4*n*	β
1882.75	191.3	0.72	4*n*	Hl
1890.24	192.9	0.80	3*n*	T
1891.24	193.5	0.71	2*n*	Hl
1896.95	187.7	0.71	3*n*	A

The distant star was noted with the 18½-inch. No other measures.

[Bird (*Ast. Reg.* I)... Da (*Ast. Reg.* **II**, 88)... Kn (*Ast. Reg.* **II**, 132)... Romberg (*Ast. Reg.* **II**, 94)... Hl (**II**)... Δ (I, p. 379)... OΣ (**X**, p. 130) ... T (3186) ... β^3... Big (*Bul. Ast.* **XII**, 299)... A (3465)... *A. G. Leipzig*, p. 247...]

4191. **OΣ 177.** Some motion in angle is probable. $33^m\ 41^s$

1873.79	138°.9	0″.64	2*n*	OΣ
1880.88	124.6	0.4 ±	4*n*	Sp
1883.28	133.6	0.39	8*n*	En
1884.06	127.3	0.65	2*n*	Per
1889.22	126.3	0.59	3*n*	Hl
1893.24	124.3	0.51	3*n*	Lewis
1899.44	123.7	0.53	3*n*	Hu

[Ma (**XI, XIII**) ... Δ (I) ... Do (2322) ... Sp (**II, III**)... Flm ... Hl (**II**)... Per... Per (2684)... En (2678)... OΣ (**IX**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 499; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794)... Big (*Bul. Ast.* **XII**, 299)... HΣ (**XII**)... Hu (*Pub. L. O.* **V**)...]

4192. **β 201.** Discovered with the 6-inch. No motion 33 42
Some of the later measures are:

1878.05	329°.0	2″.82	2*n*	Cin
1883.14	330.7	3.21	2*n*	W
1889.02	331.1	2.84	3*n*	Lv
1898.10	332.9	2.78	2*n*	Scott

[β (**IV**)... β (*Mon. Not.* **XXXIV**, 382)... Δ (I) ... Cin^5... Cin^6... Wilson (Cin^{10}) LM... Lv^1... Scott (*Mon. Not.* **LIX**, 427)...]

4193. **Σ 1126.** (= **H̥ I. 23 = Sh 82.**) There cannot be 33 44
much doubt of the physical character of this pair, but the motion is very slow.

1781.91	117°.3	....	1*n*	H̥
1829.43	132.0	1″.46	11*n*	Σ
1846.65	137.9	1.31	5*n*	OΣ
1863.51	140.7	1.33	4*n*	OΣ
1872.24	144.2	1.24	3*n*	OΣ
1891.24	142.2	1.19	2*n*	Hl
1897.29	143.1	1.18	3*n*	A
1903.19	144.3	0.98	2*n*	Biesbroeck

[Ma (*F. S.* I)... Ma (**IX, X, XI, XIII, XV**)... H (**V**)... H^1 ... Bp... Da^1... Da^3 ... Wr... J^3...... WJ^2... P^1... Lu (**II, III**)... Se ... Se^3... Bond (*Am. Acad.* **II**, 144)... K... Ra (**XXIII**)... WS... WS^2... Gl... Ba (**II, IV**)... Do (2199, 2316, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (1026, 1110, 1256)... Δ (*Mem. Accad. Sci.*)... Δ (I, pp. 53, 379)... Flm... Sk... Lv^1... Bru^2... Sp (2133)... Sp (**II**)... β^2... β^3... Je (2449)... En (2742)... Flm... Giacomelli (**II**)... T (2866) ... Hl (*Wash. Obsns.* 1883) ... Hl (I, **II**) ... Δ (**II**) ... Jones (*A. J.* 312) ... Lewis (*Mon. Not.* **LIV**, 314; **LIX**, 400; **LX**, 499; **LXI**, 486; **LXIII**, 403; **LXIV**, 794).... Glasenapp (**II**).... HΣ (**XII**).... Sk^5.... A (3465).... Brown (3645).... Biesbroeck....]

4194. **Σ 1123.** Probably fixed. 33 47

1867.91	160°.8	3″.63	3*n*	Δ

[Ma (*F. S.* I)... Ma (**XI, XIII**)... H (**V, VII**)... Wr... Δ (**II**)...]

4196. **Σ 1124.** (= **H 426.**) Without change. 33 50

1867.19	326°.0	19″.32	3*n*	Δ
1902.09	325.1	19.46	1*n*	Hu

[Ma (*F. S.* **II**).... H (**II**).... Δ (**II**).... Glasenapp (**II**).... *Annals Toulouse Obsy* **III**....]

4197. *κ Argus.* **β 1061.** (AB = **H̥ III. 27.**) The minute 33 54
star was discovered with the 36-inch. The bright stars have no sensible proper motion, and appear to be relatively fixed.

Some of the measures are given. The following are all the later measures of the small star:

B and C

1898.27	228°.6	6″.25	1*n*	See	
1898.27	228.0	6.87	2*n*	A	4 ...14.5

A and B (= H̥ III. 27)

1826.5	315°.8	8″.76		Dunlop	6½...6½
1878.20	318.4	9.96	1*n*	Cin	5.0...5.0
1882.10	318.2	10.13	2*n*	Wilson	4.3...4.7
1889.12	318.5	9.98	3*n*	β	4.1...4.1
1898.27	318.1	9.72	2*n*	A	4+...4+

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...See ( )...A (3584)...]

The following relate to the old pair:

[Dun...H (**VIII**)...P^{1}...J^{2}...WJ^{2}...Se...Se^{3}...Ra (**XXIII**)...Cin^{5}...Wilson (Cin^{10})...]

33^{m} 55^{s} **4198.** **Hn 89.** Discovered by Holden at the Washburn Observatory. Measures by Comstock.

[*Pub. Washburn Obsy.* **II**, **VI**...]

33 56 **4199.** **Σ 1128** *rej.* The only measure since Σ is:

1905.11	168°.1	15″.71	1*n*	β^{6}	8.0...10.0

34 15 **4200.** **A. G. 142.** Double in *A. G. Berlin.* Measures by Hu (*Bul. L. O.* No. 44).

34 27 **4201.** **Hu 708.** The mean of all the measures is:

1903.96	271°.0	1″.45	3*n*	Hu	9.0...12.2

[Hu (*Bul. L. O.* No. 65)...]

34 29 **4202.** **Σ 1122.** (= **S 566.**) Unchanged. These stars are given a proper motion of 0″.089 in 204°.0 (Schroeter).

1867.14	184°.7	15″.27	3*n*	Δ
1889.20	183.6	15.13	2*n*	Toulouse
1905.08	185.4	15.20	1*n*	β

[Ma (*F. S.* I)....Ma (**XI**)...Ra (**XXII**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (1204)...Δ (**I, II**)...*Annals Toulouse Obsy.* **III**...β^{6}...]

34 31: **4203.** **H̥ V. 135.** The place given in Herschel is the same as that of Σ 1122. I have carefully examined the region, and find nothing but the Struve pair. Probably there is an error in the distance in H̥.

34 37 **4204.** **Ho 523.** A star 11 m, 329° : 34″. No other measures.

[Ho (3557)...]

(See p. 1070)

34 46 **4206.** **Σ 1129.** No motion.

1868.38	63°.5	21″.68	4*n*	Δ
1903.72	63.8	21.88	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^{6}...]

4207. **See 84.** The later measures give a smaller distance. 34^{m} 57^{s}

1899.01	285°.9	8″.29	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

(See p. 1070)

4208. **A. G. 143.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 34 59

4210. **Schj. 7.** From Schj. (1485). No measures. 35 1

4211. **Σ 1130.** The following are all the late measures: 35 8

1867.23	161°.5	1″.78	3*n*	Δ
1895.34	174.3	1.34	1*n*	Leip

[Ma (*F. S.* **I**)...Ma (**X**)...Δ (**II**)...*A. G. Leipzig*, p. 208...]

4212. **H 2409.** "The *p* of four." The others are DM (19°) 1801, 1802, and 1803. 35 9

4213. **Σ 1125.** Probably unchanged. 35 17

1867.50	341°.2	22″.12	3*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

4214. **Hn 90.** Measures by Comstock. 35 36

[*Pub. Washburn Obsy.* **II**, **VI**...]

4215. **Σ 1127.** Unchanged. 35 53

A and B

1870.59	339°.9	5″.39	5*n*	Δ
1898.33	338.6	5.28	1*n*	Gla

A and C

1867.24	176°.6	11″.08	3*n*	Δ
1898.33	175.3	11.33	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Bl (**V**)...Ra (**XXIII**)...Se...Δ (1118)...Δ (**I, II**)...Glasenapp (**V**)...]

4216. **Innes 185.** Discovered at the Cape of Good Hope. 35 55

[Innes (*Mon. Not.* **LXIII**, 76) (*A. N.* 3438)...]

4217. **Hn 91.** Measures by Comstock (*Pub. Washburn Obsy.* II, VI). 36 0

4219. **Σ 1132.** (= **H̥ IV. 96** = **S 558.**) A little increase in the distance from proper motion. 36 13

1867.46	236°.5	19″.52	3*n*	Δ
1879.18	237.0	19.84	2*n*	Cin
1893.18	235.3	19.87	2*n*	Gla

[Ma (*F. S.* **I**)...Δ (**I, II**)...Δ (1118)...Pt...Sk^{2}...WS...Gl...Flm...Cin^{5}...Glasenapp (**II**)...Giacomelli (**II**)...]

36^{m} 35^{s} **4222. Σ 1133.** Probably unchanged.

1866.93	107°.7	4″.26	3*n*	Δ
1893.18	111.3	4.36	2*n*	Gla

[Ma (*F. S.* **I**)...Hd...Gl...Cin⁵...Δ (**II**)...Glasenapp (**II**)...]

37 0 **4223. Hu 709.** The mean of the measure in Part I, and one later is:

1903.54	287°.9	1″.87	2*n*	Hu	9.0...9.5

[Hu (*Bul. L. O.* No. 65)...]

37 12 **4226.** *κ Geminorum.* **OΣ 179.** (= **H 427.**) H called the companion 14 m; Σ 10 m; Δ and OΣ 8.5 m. It has been suggested that B is variable, but this is probably not the case. There is no certain change in either angle or distance.

The proper motion of the large star is:

A. G. Berlin	0″.072 in 220°.1
Newcomb	0.063 in 198.0

1828.27	229°.6	6″.19	1*n*	Σ
1868.03	233.1	6.32	4*n*	Δ
1879.13	234.4	6.45	3*n*	Hl
1898.09	236.1	6.73	3*n*	Hu
1903.27	235.6	6.57	3*n*	Biesbroeck

[Ma (**XI, XIII**)...Da¹...Da³...Ba (**II**)...OΣ (**IX**)...Du...Bru...Bru²...Flm ...Pk...Sp (**II**)...Per...Per (2684)...En (2678)...Δ (**I**)...β³...T (2991)... Hl (**I, II**)...Maw (**I**)...Ho (3558)...HΣ (**XII**)...Do (3680)...Hu (*Pub. L. O.* **V**)...Boeger (*A. J.* 522)...Biesbroeck...]

37 13 **4227. Σ 1134.** (= **H II. 39.**) Relatively fixed. The proper motion of A is 0″.097 in the direction of 158°.2 (*A. G. Albany*), and this is therefore the movement of C.

1869.37	147°.1	10″.02	4*n*	Δ
1890.09	145.9	10.16	4*n*	T

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Flm...Sk²...T (3185)...]

37 34 **4228. Hu 710.** A later set of measures gives:

1904.83	19°.5	0″.31	3*n*	Hu

Hu finds SD (16°) 2100, which is 67ˢ *f* and 8′ *n*, is a close pair:

1904.81	140°.1	0″.24	3*n*	Hu	8.0...8.5

[Hu (*Bul. L. O.* No. 65)...] (See No. 13141)

37 53 **4232. OΣ 181.** Unchanged.

1868.04	261°.2	6″.26	3*n*	Δ
1898.53	259.5	6.57	3*n*	Hu

[Ma (**XI, XIII**)...Δ (**I**)...OΣ (**IX**)...Hu (*Pub. L. O.* **V**)...]

37 58 **4233. β** *Geminorum. Pollux.* **β 580.** (AC = **H VI. 42** = **S 559**; AF = **Σ 5, App. II.**) The duplicity of Herschel's distant companion to *Pollux* was discovered with the 18½-inch. The nearest star, B, was found with the same instrument. The measures show no sensible motion in CD. *β Geminorum* has a proper motion of 0″.637 in the direction of 266°.0 (Auwers). The change in the position of the faint star, B, is due to this movement of A. With this proper motion and the measures of 1892, the minimum distance of 7″.0 will occur about 1945. It will then be a very difficult object, and beyond the reach of most telescopes. It is not easily seen now with any aperture.

The change in the distant stars, C, E, and F, corresponds to the proper motion of A.

All the later measures of CD are given:

C and D

1889.14	130°.9	1″.14	1*n*	β	9.5...12.5
1892.14	130.6	1.14	3*n*	β	10 ...11.8
1898.89	131.2	1.27	1*n*	A	10.0...13.0
1899.02	140.7	1.02	1*n*	β	9.7...11.5
1901.31	137.1	1.45	1*n*	Lewis	

A and B

1892.14	277°.9	34″.10	3*n*	β	...14.3
1898.88	280.0	30.22	2*n*	A	...15.0
1898.96	278.1	30.88	1*n*	β	...15.0
1900.08	280.0	29.65		Gr. Obsy.	

A and C (= H VI. 42 = S 559)

1878.73	71°.0	174″.61	2*n*	β
1884.27	71.1	176.98	1*n*	HΣ
1898.81	71.7	187.57	1*n*	β
1898.87	71.8	187.72	1*n*	A

A and E

1898.81	90°.0	218″.54	1*n*	β	...11.0
1898.87	90.0	219.10	1*n*	A	...10.0

A and F (= Σ 5, App. II)

1781.90	74°.1	160″.70	1*n*	H
1850.71	74.4	213.28	2*n*	OΣ
1867.52	75.1	223.41	4*n*	Δ
1879.24	75.3	229.24	1*n*	β
1884.21	75.6	233.15	2*n*	HΣ
1898.81	76.3	242.87	1*n*	β
1898.87	75.8	242.57	1*n*	A

C and F

1884.16	89°.5	57″.98	1*n*	HΣ
1898.96	89.4	58.01	1*n*	β

[β (**X**)...β¹...β³...β (2930, 3141) (*Pub. L. O.* **II**)...A (3584)...Greenwich Obsy. (*Mon. Not.* **LX**, 518; **LXII**, 387)...]

The following, in addition to the catalogues of H, South, and Σ, relate to the distant stars:

[Δ (**II**)...Flm...OΣ (**X**, p. 77)...]

38^{m} 12^{s} **4234. Ho 246.** A later measure is:

1890.25	219°.8	2″.11	1*n*	Ho

[Ho (2977, 3558)...] (See p. 1070)

38 18 **4238. OΣ 180.** Probably unchanged.

1848.63	204°.4	14″.86	3*n*	OΣ
1868.31	204.8	14.91	3*n*	Δ
1898.24	204.5	16.16	3*n*	Hu
1905.11	203.2	16.04	1*n*	β

[Ma (**XI, XIII**)...Δ (**I**)...OΣ (**IX**)...Hu (*Pub. L. O.* **V**)...β⁶...]

38m 42s **4240.** **See 85.** Later measures at the Lowell Observatory:

1899.89	34°2	26″09	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

38 43 **4241.** **Σ 1131.** Probably unchanged.

1868.21	176°0	2″50	3*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)...Ma (**XI**)...Δ (**II**)...]

39 30 **4247.** **Schj. 8.** Discovered by Schjellerup. Measures by Dembowski.

[Schj (1485)...Δ (**I**)...]

39 46 **4249.** *π Geminorum.* **Σ 1135.** (= **♅ IV. 53 = Sh 83.**) The third star, C, is not in Σ. It is nearly the same magnitude as B. The large star has a proper motion of 0″015 in 246°4 (Auwers). The distance of B is decreasing, and it is apparently due to this movement of A.

1866.96	211°6	22″05	3*n*	Δ	...10.8
1903.96	212.4	21.19	2*n*	β	...10.0

The only observation since 1823 of the more distant star is:

1903.96	341°0	92″00	2*n*	β	...10.0

[Ma (*F. S.* **II**)...Ma (**XIII**)...H (**II, VII**)...Pk...Δ (**II**)...β^{6}...]

39 58 **4250.** 2 *Navis.* **Σ 1138.** (= **♅ IV. 91 = Sh 84.**) Fixed. The principal star has a proper motion of 0″029 in 270°0 (Porter.)

1868.66	338°8	16″83	4*n*	Δ
1893.18	338.6	16.94	2*n*	Gla

Glasenapp measures a distant 10.5 m star 228°6 : 101″36 (1893.18) 2*n*.

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... H (**VII, VIII**)...J^{2}...Hl (*Wash. Obsns.* 1863)... Hl (**I**, p. 130) ... En... Ra (**XXIII**) ... Δ (1204) ... Δ (**I, II**)...Cin^{1}...Cin^{5}... Wilson (Cin^{10}) ... Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

40 14 **4252.** **Ho 36.** Discovered with the Chicago 18½-inch.

1890.24	298°1	0″40	1*n*	Ho

[Ho (2778, 3234)...] (See p. 1070)

40 15 **4253.** **Σ 1137.** Fixed.

1869.16	132°9	2″97	4*n*	Δ
1890.10	134.8	2.72	2*n*	T

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**V**)...Δ (**II**)...T (3185)...]

40 30 **4255.** **A. G. Clark 2.** Discovered by Alvan G. Clark in 1876 with the 12-inch now at Vienna. Measures from β^{3}. The only other measure is the following:

1904.27	120°0	0″81	1*n*	A

40 53 **4256.** **Σ 1141.** H measures a 13 m star, AC 84°1; BC 129°0. No change in AB.

1867.10	9°7	17″53	3*n*	Δ
1893.18	8.8	17.73	2*n*	Gla

[Ma (*F. S.* **I**)...H (**V, VII**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...]

4258. **S 560.** S calls this σ 279, but, "a doubt as to the identity of this with ♅ V. 67." In *Pos. Med.* σ 279 and ♅ V. 67 are identical. For the latter H gives same R. A. but 9′ *n*. No measures of angle, but D = 47″62 (1783.16). I could find only S 560 here, so the place or distance in ♅ must be erroneous. The place given here is correct. The only measures are: 41m 0s

1873.24	358°7	89″90	4*n*	OΣ	7.0...8.5
1901.77	358.8	89.59	2*n*	β	6.5...8.6

[OΣ (**X**)...β^{5}...]

4260. 82 *Geminorum.* **β 1062.** Discovered with the 36-inch. The principal star has a proper motion of 0″030 in the direction of 299°8 (*A. G. Berlin*). 41 23

1898.96	35°8	3″82	1*n*	β
1905.14	33.0	4.01	1*n*	β

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...β^{6}...]

4261. **Σ 1140.** (= **♅ II. 64 = Sh 85.**) Fixed. 41 26

1866.31	273°0	6″03	3*n*	Δ
1894.18	272.3	6.41	2*n*	Coleman

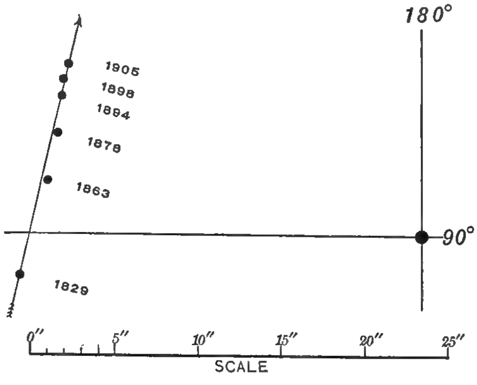
[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Wr... Δ (**II**) ... Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

4262. **Σ 1144.** (= **♅ II. 65.**) No material change. 41 32

1867.41	357°3	8″07	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

4264. **Σ 1142.** Very decided rectilinear motion. The measures give for the proper motion of A, assuming B to be stationary, 0″177 in 347°5. 41 40



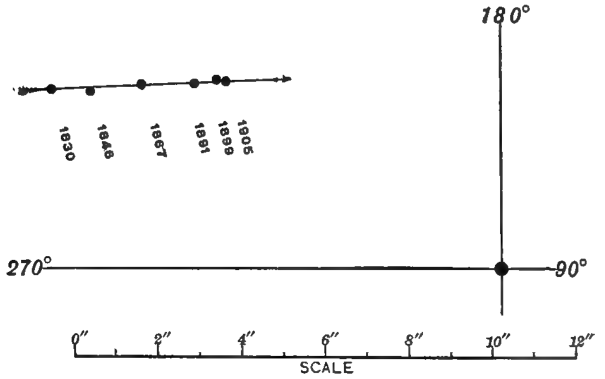
Σ 1142

1829.47	275°9	24″36	4*n*	Σ
1863.41	262.0	22.83	4*n*	Δ
1878.22	254.5	22.84	1*n*	β
1894.17	248.8	23.35	3*n*	HΣ
1898.27	246.5	23.54	4*n*	Doo
1905.08	244.4	23.70	2*n*	β

[Ma (*F. S.* **II**) ... Ma (**XIII, XV**) ... Gl ... Sk ... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... WS ... β^1 ... Δ (1474) ... Δ (**II**) ... Flm...Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ... Sk^5... Furner and Storey (*Mon. Not.* **LXIV**, 445)...β^6...]

(See p. 1070)

41^m 40^s **4265.** **Σ 1136.** (= **OΣ 184** *rej.*) The distance is decreasing from proper motion of A, which is about 0″.05 in 270°.



Σ 1136

1830.65	248°.5	11″.61	3*n*	Σ
1846.78	246.9	10.68	2*n*	OΣ
1867.49	243.1	9.67	3*n*	Δ
1891.17	239.0	8.57	2*n*	Hl
1899.62	236.4	8.16	3*n*	Hu
1905.08	236.2	7.97	2*n*	β

[Ma (*F. S.* **II**) ... Ma (**XI, XV**) ... OΣ (**IX**) ...Hl (**I, II**) ... Δ (2194) ... Δ (**II**) ... Flm...Sk...Sk^2...Sk^5...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...Thiele (3837)...β^6...]

41 41 **4266.** **Σ 1143.** The measures are from the first observation by Σ. He could not find it on three later occasions. It is a clear case of an error of some kind in the place. It is certainly nowhere in the immediate vicinity. Dembowski could not find it 1863-64, and I failed in 1874-76. I examined the neighborhood of the assigned place very thoroughly with the 18½-inch in 1878, and again in 1890 with the 36-inch. It may be possible hereafter to identify this pair, from the angle and distance, with some one already known, but it will be found in some other part of the sky. So far I have not been able to find any pair in this catalogue which corresponds sufficiently near in all particulars to make it probable that it is the missing double. It should be noted that the star measured by Struve does not at all correspond with the original Σ 1143, which is described in *Catalogus Novus*, "Cl. III et IV, 7...11." The 7 m star in this place has two very distant companions nearly north.

[Δ (1736)...Sadler (*Eng. Mech.* **XL**, 493)...T (*Eng. Mech.* **XLIII**, 53)...β (*Ast Reg.* **XIX**, 120)... β^1...β^3...β (3048) (*Pub. L. O.* **II**)...]

41 48 **4267.** **H 62.** Since Part I was in type, I have identified this as SD (5°) 2246, the place of which is:

$$\left.\begin{array}{l}\text{R. A.} = 7^h\,41^m\,21^s\\ \text{Decl.} = -5^\circ\,25'.3\end{array}\right\}$$

There is a faint star near B, about one-half the distance of A.

AB	1905.09	233°.4	39″.40	1*n*	β^6	9.5...10.8

4269. 5 *Navis.* **Σ 1146.** Without material change, but the components have a common proper motion of 0″.148 in 302°.8 (Innes). 42^m 19^s

1867.44	17°.1	3″.28	3*n*	Δ
1887.20	15.4	3.25	3*n*	Hl
1903.16	13.7	3.29	5*n*	Jouffray

[Ma (*F. S.* **I**)....Ma (**XII, XV**)....H^1....H^2....Se....Se^3....Wr....Hl (*Wash. Obsns.* 1863)...Hl (**I, II**)... Ra (**XXIII**)... Δ (1204)... Δ (**I, II**)...Hd...WS Gl...OΣ (**IX**)...Cin^5...Cin^6...Wilson (Cin^{10})...T (2898)...En (2663)...LM ...Glasenapp (**II**)...Scott (*Brit. Ast. Ass'n* **V**, 75)...Lunt (*Mon. Not.* **LXII**, 472)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

4274. **H 61.** The only later measures are from *A. G. Leipzig*, p. 247. 42 46

1895.34	175°.9	14″.75	1*n*	9.2...9.6

4275. **OΣ (App) 88.** Unchanged. 42 47

1905.11	4°.9	56″.67	1*n*	β

[Δ (**I**)...β^6...]

4276. **H 4003.** Double in Gould. The only measures are by Innes (*Mon. Not.* LXIV, 132). 42 49

1902.18	117°.0	31″.2	2*n*	Innes

4277. **H 65.** "8 m star 8^s *p* and 2′ *n*." This is DM (13°) 1775. 42 59

4279. **Ho 37.** Discovered by Hough with the 18½-inch. Without change. 43 55

1888.78	175°.2	1″.60	2*n*	Lv
1889.23	176.6	1.18	3*n*	Ho
1904.53	175.5	1.45	2*n*	β

[Ho (2778)...Lv^1...Ho (3234)...β^6...] (See p. 1070)

4280. **Σ 1147.** Unchanged, but the components have a common proper motion: 43 5

A. G. Berlin	0″.143	in	5°.4
Battermann	0.121	in	353.5

1867.86	163°.1	2″.35	3*n*	Δ
1880.54	165.0	2.14	2*n*	β
1903.11	163.3	2.32	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...β^6...]

4281. *o* **Argus.** **See 86.** Later measures are: 43 6

1900.00	198°.3	26″.73	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

4282. **H 3301.** "Very difficult." Not seen by me with the 6-inch on one occasion in 1876. With 18½-inch, P = 61°.6 (1878.9) 1 *n*. 43 8

1905.02	62°.3	23″.46	1*n*	β^6	...13.5

43^m 13^s **4283.** **Σ 1149.** Fixed.

1866.44	40°6	21″73	3*n*	Δ
1890.08	41.6	21.77	2*n*	T

[Ma (*F. S.* I)...Ma (XI)...H (V)...En...Δ (II)...T (3185)...]

43 15 **4284.** **Σ 1145.** Apparently fixed. Late measures wanting.

1867.54	55°7	1″17	3*n*	Δ

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...]

43 24 **4285.** **S 561.** These three stars, A, B, and C, are respectively Cordoba G. C., 10197, 10198, and 10196, with magnitudes, 8¾, 9¼, and 9¼. BC not measured by South, but estimated, 235°: 5″. The Cordoba meridian positions give for AB, 2°0 : 51″60 (1880.96). The only measures are given below. There are many small stars in the field.

AB	1904.22	3°2	51″32	1*n*	β^6	8.5...9.0
BC	1904.22	214.3	10.04	1*n*	β^6	...9.3

43 29 **4286.** **OΣ (App) 89.** The only other measures are:

1886.28	82°7	76″73	5*n*	Franz

[Δ (I)...Franz (3080)...]

43 38 **4287.** **H 2418.** Nothing since Herschel but the following:

1880.21	216°6	21″95	2*n*	Big

44 15 **4290.** ξ *Argus.* **β 1063.** Discovered with the 36-inch. The principal star has a small proper motion, 0″029 in the direction of 326″3 (Auwers). So far there is no change in the companion.

1898.27	189°8	4″92	2*n*	A	4.2...14.0

[β (XV)...β (2929)...β (*Pub. L. O.* II)...A (3584)...]

44 29 **4292.** **See 87.** The only later measure is:

1899.86	151°1	4″72	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

44 35 **4293.** **Ho 248.** The only later measure is:

1890.25	91°6	19″72	1*n*	Ho

[Ho (2977, 3558)...]

(See p. 1070)

44 39 **4294.** **Innes 186.** Discovered at the Cape of Good Hope.

[Innes (3438) (*Mon. Not.* LXII, 474)...]

44 43 **4296.** **H 431.** "Very delicate." Examined and estimated 60° (1876).

44 46 **4297.** **A. G. 144.** Double in *A. G. Berlin.* Measures by Cogshall (*A. J.* 546).

4299. **Σ 1152.** No material change. 44^m 58^s

1868.87	311°4	5″96	4*n*	Δ
1878.22	314.1	6.05	1*n*	β

[Ma (*F. S.* I)...Δ (II)...β^1..Cin^3...]

4302. **β 1195.** Discovered with the 36-inch. 45 35

1898.06	81°6	0″46	2*n*	A	7.7...7.7

[β (XVII)....β (3047) (*Pub. L. O.* II)...A (3584)...]

4303. **Hd 110.** I could not find this unless it is CD of β 1319 (No. 4305). 45 43

4304. **Σ 1153.** Fixed. 45 54

1868.32	357°2	19″43	3*n*	Δ

[Ma (*F. S.* I)...Ma (XI)...En...Δ (II)...]

4305. **β 1319.** Found in looking for Hd 110, which was not found unless it is CD of this pair. There is a 12 m star from AB, 43°1 : 18″1. 45 57

[β^6...]

4309. **Σ 1154.** Probably without change. 46 7

1868.15	356°4	2″04	3*n*	Δ
1878.22	352.9	2.41	1*n*	β

[Ma (*F. S.* I)...Δ (II)...β^1...]

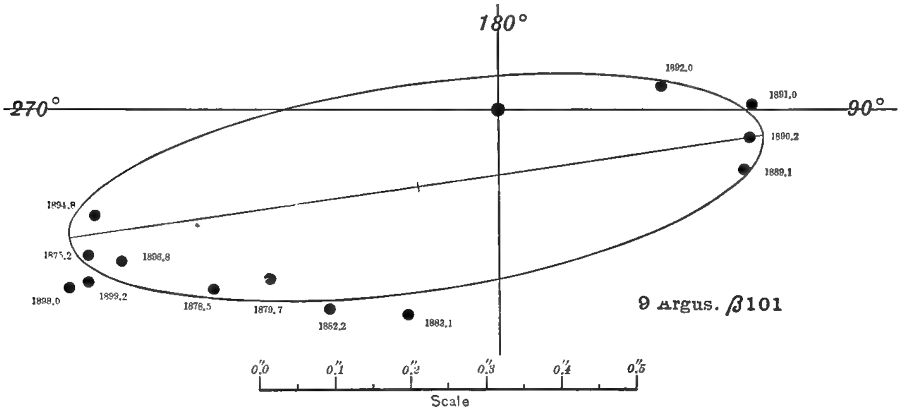
4310. 9 *Argus.* **β 101.** Discovered with the 6-inch. One of the most interesting of the rapid binaries from its short period, and the large proper motion of the system. The following are all the measures: 46 13

1875.24	289°7	0″58	2*n*	Δ
1878.47	302.6	0.45	4*n*	Cin
1878.52	301.8	0.46	2*n*	β
1879.68	306.2	0.38	2*n*	Hl
1882.21	319.7	0.35	4*n*	Sp
1883.11	336.2	0.3±	1*n*	β
1888.26	356.1	0.29	5*n*	Sp
1889.08	76.4	0.34	4*n*	β
1890.19	83.0	0.4±	2*n*	Sp
1890.26	84.6	0.31	4*n*	β
1890.96	88.3	0.36	3*n*	β
1891.15	94.7	0.3±	1*n*	Sp
1892.05	98.7	0.22	3*n*	β
1892.26	165.2	0.25	2*n*	Sp
1893.24	158.0	0.23	8*n*	Sp
1894.06	282.0	0.43	6*n*	Barnard
1894.24	286.6	0.35	2*n*	Comstock
1894.25	280.2	0.44	6*n*	Sp
1894.84	287.2	0.63	4*n*	Barnard
1895.21	285.2	0.42	2*n*	Comstock
1895.22	285.4	0.58	5*n*	Barnard
1895.24	282.4	0.51	5*n*	Sp
1895.30	283.8	0.58	3*n*	See
1896.21	288.1	0.53	1*n*	Sp
1896.24	287.0	0.49	3*n*	Comstock

1896.86	292°.1	0″.54	3n	A
1897.38	290.4	0.69	4n	Doo
1897.81	288.8	0.64	1n	β
1897.85	292.7	0.62	3n	A
1897.95	292.9	0.61	3n	Hu
1898.13	294.3	0.67	2n	Hu
1898.18	292.5	0.62	2n	Brown
1898.23	292.3	0.63	2n	Doo
1898.29	289.4	0.61	3n	A
1898.77	295.7	0.66	3n	Hu
1899.04	295.9	0.32	1n	Bryant
1899.62	295.4	0.55	5n	A
1901.13	301.7	0.61	4n	Doo
1901.26	299.6	0.47	3n	A
1901.31	302.7	0.48	1n	Bryant
1903.17	305.5	0.44	1n	Bryant
1904.23	338.1	0.46	2n	Biesbroeck
1905.14	321.0	0.46	1n	β
1905.22	316.7	0.28	1n	A

This system has considerable proper motion:

Auwers	0″.351 in 195°.4
Porter	0.343 in 193.5



Four orbits have been found for this pair, using the measures to the dates given:

1892	Glasenapp	40.54 yrs.	*Mon. Not.* LII, 546
1892	Burnham	23.3	*Pub. L. O.* II, 239
1892	Glasenapp	23.33	*Mon. Not.* LIV, 318
1895	See	22.00	*A. N.* 3297

The orbit found by me in 1892, with some of the later measures added, is shown on the diagram. (See p. 1070)

[β (**II**) ... β (*Mon. Not.* **XXXIII**, 437) ... β1 ... β3 ... β (2930, 2979, 3048, 3114) (*Ast. and A.-P.* **XII**, 494; **XIII**, 290) ... Δ (**II**) ... Hl (**I**) ... Hl (*Wash. Obsns.* 1879, 1880) ... Cin5 ... Sp (**II**, **II**, App. **III**) ... Glasenapp (*Mon. Not.* **LII**, 546; **LIV**, 318) ... Gore (*Mon. Not.* **XLVII**, 61) ... Everett (*Mon. Not.* **LVI**, 464) ... Com (*Ast. and A.-P.* **XIII**, 518) (*Pub. Washburn Obsy.* **X**) ... See (*Evolution of the Stellar Systems* **I**) (*A. J.* 349, 378) ... See (3297, 3314) ... Barnard (*A. J.* 447) .... Brown (3645) .... Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I**) .... A (3465, 3584, 3638) (*Bul. L. O.* No. 11) (*A. J.* 429) ... Hu (*A. J.* 427) (*Bul. L. O.* No. 44) ... Greenwich Obsy. (*Mon. Not.* **LX**, 499; **LXII**, 383; **LXIV**, 794) ... Biesbroeck ... β6 ...]

$46^m\ 24^s$ **4312. OΣ 182.** The measures are discordant, and, on the whole, change is not very certain.

1843.25	42°.6	0″.84	2n	Ma
1867.00	39.8	1.23	3n	Δ
1880.09	40.1	0.99	2n	β
1881.39	30°.4	1″.07	6n	Je
1885.10	34.4	1.17	3n	Per
1888.12	34.2	1.15	3n	Lv
1893.19	31.9	1.26	2n	Lewis
1897.31	32.7	1.32	3n	Doo
1898.10	33.4	1.03	4n	Hu

[Ma (**XI**) ... OΣ (**IX**) ... Δ (**I**) ... Flm ... Per ... Pt . . En (2678) ... T (2866) ... Do (2989) ... (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Je (2449) ... Cin6 ... β3 ... Lv1 ... Jones (*A. J.* 312) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 499; **LXI**, 490; **LXIII**, 403; **LXIV**, 794) ... Big (*Bul. Ast.* **XII**, 299) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Hu (*Pub. L. O.* **V**) ...]

4313. Hu 711. With a later measure the mean is: $46^m\ 26^s$

1903.86 199°.3 4″.13 2n Hu 7.7...12.0

[Hu (*Bul. L. O.* No. 65) ...]

4314. Hu 712. With a later measure the mean is: 46 26

1903.86 149°.9 1″.27 2n Hu

[Hu (*Bul. L. O.* No. 65) ...]

4315. A. G. 145. Measures from *A. G. Leipzig*, p. 248. 46 33

4320. H III. 28. H says "near 9 *Argus;* place very doubtful." The place by H is that of 9 *Argus.* Examined and identified as L 15389. This star has a proper motion of 0″.101 in 133°.8 (Bossert). The following is the only observation since 1781: 46 53

1901.20 194°.8 24″.00 2n β5 7.1...10.7

4321. Weisse 16. The only measure is: 46 56

1905.12 36°.7 22″.50 1n β6 9.0...9.3

4322. OΣ 183 *rej.* Distance and magnitudes from *Poulkowa Catalogue* of 1843; rejected in the second edition. Ma has a single measure of the angle, 14°.5 (1843.25), but no distance. Dembowski could not see it in 1866, and my 6-inch failed to show it in 1875. These are all the measures: 47 8

1878.12	19°.8	16″.19	3n	β
1899.91	21.6	15.92	3n	Hu
1901.81	20.2	15.79	2n	β

[Ma (**XI**) ... Δ (I, p. 228) ... β1 ... Hu (*Pub. L. O.* **V**) ... β5 ...]

47^m 10^s **4324.** **Σ 1155.** Unchanged.

1867.53	341°.7	15″.08	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

47 16 **4325.** **Weisse 17.** Noted, "duplex 6″" in W^2. (See No. 4340.) The only measures are:

1905.09	94°.3	6″.99	2*n*	β^6	8.8...8.8

47 26 **4326.** Measured in looking for H III. 28 (No. 4320).

[β^5...]

47 35 **4327.** **H 769.** "Requires the eye to be turned aside." In SD 9.1 m.

48 31 **4333.** **Σ 1157.** The angle and distance slowly decreasing. Probably binary of long period.

1831.20	267°.3	1″.59	3*n*	Σ
1863.11	256.8	1.29	3*n*	Δ
1878.72	250.9	1.24	4*n*	Cin
1887.60	247.0	1.28	3*n*	T
1893.03	245.8	1.04	4*n*	Jones
1899.52	243.8	1.17	3*n*	Bryant

[Ma (*F. S.* **I**)... Se...Se^2...Se^3...Δ (1185, 1474)...Δ (**I, II**)...WS...Flm...Pt Sk...Sk^2...T (2898)...LM...Jones (*Proc. Haverford Coll. Obsy.* 1892) (*A. J.* 312)...Hd...Gl...Sp (**II**)...Cin^5...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 499; **LXI**, 486)...Ho (3234)...Do (3378, 3799)...Brown (3645)...Scott (*Mon. Not.* **LXIV**, 52)...Biesbroeck...]

48 44 **4334.** **H 4013.** This is SD (17°) 2219 (7.0).

1902.88	197°.2	19″.32	2*n*	β^6	7.1...10.7

The 9.4 m star, SD (17°) 2217, which is 67″ distant in 270°.6, has a 13 m companion about 3″ distance.

48 47 **4335.** **Σ 1156.** This is identical with Σ 1163. Error of 2^m R.A. of latter in *Mens. Micr.* Relatively fixed.

1867.97	159°.3	18″.89	7*n*	Δ
1880.14	160.0	18.64	1*n*	β

[Ma (*F. S.* **II**)...Δ (1979)...Δ (**II**)...β (*Mon. Not.* **XXXVI**, 99)...β^3...]

49 16 **4338.** **Σ 1151.** No recent measures.

1868.11	222°.9	3″.56	4*n*	Δ

[Ma (*F. S.* **I**)...Δ (**II**)...]

49 22 **4339.** **A. G. 146.** Double in *A. G. Harvard.* Measures by Espin.

1901.77	284°.2	3″.20	2*n*	β	8.9...8.9

[Espin (3717)...β^6...]

49 23 **4340.** **Ma 4.** From list of new pairs in Ma (XI). Since Part I of this catalogue was in type, I have looked this up and find that this star is not double. Ma 4 is identical with No. 4325.

4341. **Σ 1158.** Wr speaks of a second, very faint companion. Readily seen with 6-inch, and estimated, 250°: 15″: 11.5 m. No change in AB. 49^m 26^s

1867.88	333°.2	7″.32	3*n*	Δ
1905.08	332.1	7.40	1*n*	β

The only measure of the more distant star is:

1905.08	268°.8	19″.00	1*n*	β	...12.5

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

4342. **Hn 92.** Discovered at the Washburn Observatory. No other measures. 49 28

[*Pub. Washburn Obsy.* **II, VI**...]

4344. **H 71.** "A similar double *p*." The 7.5 m star, Schj. 2896, is noted "duplex?" This is 1^m 13^s *f* and 1′ *n* of H 71 (= SD (3°) 2129). This is a distant 10 m companion, 357°.3 : 77″.1. The only measure of H 71 is: 49 41

1905.08	210°.4	19″.68	1*n*	β^6	9...10

4349. **Σ 1162.** Unchanged. 50 41

1867.07	327°.2	8″.96	3*n*	Δ
1893.23	327.3	9.11	1*n*	Leip

[Ma (*F. S.* **I**)....Ma (**XI, XIII, XV**)....H (**VI**)....WS....Gl....Δ (**II**)....*A. G. Leipzig*, p. 208....]

4353. **Σ 1161.** Fixed. 51 3

1867.18	192°.4	2″.55	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

4355. **OΣ 185.** This is a close pair at all times, and frequently noted as single. It may be in rapid motion, but if so, the plane of the orbit is nearly in the line of sight. The measures show no considerable change in angle. Elongated only at Poulkowa 1861–69, and single 1870–73; single to Δ 1866. I found it clearly elongated with the 6-inch 1874, with distance not more than 0″.4. In 1878 it appeared to be single on two occasions with the 18½-inch. Sp found it single 1877–87. On the other hand, it was measured by En in 1883 with a small aperture, and my measures at Mt. Hamilton show no appreciable change in distance. The negative results may possibly be explained by unsuitable conditions for so close a pair. The following are some of the measures: 51 6

1847.29	23°.5	0″.39	3*n*	OΣ
1883.85	28.4	0.28	5*n*	En
1890.96	6.0	0.22	3*n*	β
1892.18	9.4	0.25	3*n*	β
1898.10	17.6	0.53	3*n*	Hu
1900.14	13.5	0.30	2*n*	Bryant
1903.14	18.7	0.34	2*n*	Bryant
1903.82	22.8	0.42	2*n*	Biesbroeck

This star has a proper motion of 0″.18 in 270° (Boss).

[OΣ (**IX**)...Ma (**XI**)...Se...Δ (**I**, p. 228)...Sp (**II, II** App.)...Flm...En (2742)...T (3186)...β (3048, 3141) (*Pub. L. O.* **II**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794)...Brown (3645)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

(See p. 1070)

$51^m\ 41^s$ **4357.** **Σ 1160.** No motion.

1867.25	32°8	6″35	3*n*	Δ

[Ma (*F. S.* I) . . . Ma (**XI**) . . . Δ (**II**) . . .]

51 43 **4358.** **Σ 1167.** Unchanged.

1868.39	228°4	11″74	3*n*	Δ
1904.42	227.7	12.28	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI**) . . . H (**VI**) . . . Δ (**II**) . . . β6 . . .]

51 46 **4359.** **Sh 86.** *Ursae Majoris* 2. (= σ 282 = OΣ (App) 90.) Place from *Pos. Med.* Relatively fixed.

1875.62	81°8	47″41	3*n*	Δ	6.0 . . . 7.0
1882.83	81.7	47.64	6*n*	Fr	6.5 . . . 7.7

[Δ (**I**) . . . Franz (2649) . . .]

(See p. 1070)

52 8 **4361.** 14 *Canis Minoris.* **Sh 87.** (= **♅ VI. 84** = σ 283.) Change from the proper motion of A. This is given from meridian positions:

Porter	0″209 in 298°9
Bossert	0.197 in 294.0
Boss	0.195 in 296.6

A and B

1783.03	63°6	65″47	1*n*	♅
1887.28	73.4	83.80	2*n*	Eng
1894.27	74.1	84.84	3*n*	Eng
1905.17	75.2	85.82	2*n*	β

A and C

1887.28	151°8	113″80	2*n*	Eng
1894.27	151.8	115.21	3*n*	Eng
1905.18	151.3	117.18	1*n*	β

[Eng (**II, III**) . . . β6 . . .]

52 22 **4363.** **Σ 1168.** *Canis Minoris* 54. Possibly a slight change in the angle.

1867.81	216°3	5″94	3*n*	Δ
1880.09	218.2	5.94	2*n*	β

[Ma (*F. S.* I) . . . Δ (**II**) . . . β3 . . .]

(See p. 1070)

52 22 **4364.** **β 902.** Discovered with the 18½-inch. All the later measures are given:

1879.27	244°3	1″18	1*n*	Cin
1892.20	243.7	1.17	3*n*	Lv
1901.10	243.1	1.25	4*n*	Doo

[β (**XIII**) . . . β3 . . . Cin5 . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . Doolittle (*A. J.* 547) . . .]

52 41 **4365.** **Σ 1165.** Probably no motion, but later measures are needed.

1849.88	268°5	0″85	3*n*	OΣ
1867.04	266.6	0.84	3*n*	Δ
1878.84	273.7	0.68	1*n*	β

[Ma (*F. S.* I) . . . OΣ (**IX**) . . . Ma (**XI**) . . . Bl (**V**) . . . β3 . . . Δ (**II**) . . .]

4369. **Σ 1170.** Unchanged. $53^m\ 2^s$

1867.08	97°2	2″15	3*n*	Δ
1897.19	99.9	2.07	1*n*	Gla

[Ma (*F. S.* I) . . . Ma (**XI**) . . . Δ (**II**) . . . Glasenapp (**V**) . . . *Annals Toulouse Obsy* **III** . . .]

4372. **Hu 222.** Noting the great similarity of this pair and Hn 94 (No. 4381), I have examined this since Part I was in type, and find that they are in fact identical, Hu 222 being wrongly identified. The place of the other is correct. 53 38

4373. **Hn 93.** No other measures. 53 40

[*Pub. Washburn Obsy.* **II, VI** . . .]

4375. **Σ 1164** *rej.* The only measures are those given by β6 The principal star has a considerable proper motion: 53 49

Porter	0″332 in 221°3
A. G. Chris.	0.339 in 220.1
Schroeter	0.349 in 222.1

4376. **H 74.** Later H (VI) found 290°8 : 10″ : 11-12 . . . 13 (1831+). From this he thought distance had changed, but the first estimate is probably erroneous, as I found it in 1875 as last described. 53 50:

4377. **Σ 1171.** *Cancri* 5. Change doubtful, as it appears from all the later measures that the angle of Σ is too large. There is a common proper motion of 0″056 in 259°7 (*A. G. Berlin*). 53 51

1844.26	332°0	2″98	1*n*	Ma
1864.85	330.1	2.49	5*n*	Δ
1879.10	332.4	2.70	2*n*	β
1894.18	330.0	2.58	2*n*	HΣ
1903.06	329.1	2.61	2*n*	Do

[Ma (*F. S.* I) . . . Ma (**XI, XIII**) . . . Δ (1572) . . . Δ (**II**) . . . Flm . . . β1 . . . β3 . . . HΣ (**XII**) . . . Do (3930) . . .]

4378. **♅ II. 101.** "Place in catalogue very doubtful." I could not find it in 1875. The place is certainly wrong. It is probably identical with Σ 1127. 54 :

4381. **Hn 94.** Discovered by Holden at the Washburn Observatory. (See No. 4372.) Measures by Comstock. The distance by Hough is too small. 54 14

1890.20	281°0	1″82	2*n*	Ho
1905.16	279.4	3.18	2*n*	β

[*Pub. Washburn Obsy.* **II** . . . Com (**VI**) . . . Ho (3234) . . . β6 . . .]

4382. **H 2423.** (= **Ho 348.**) "Difficult." The only measures are: 54 17

1892.73	261°7	5″25	2*n*	Ho	8 . . . 12

[Ho (3233) . . .]

(See p. 1070)

54m 30s **4383.** ω² *Cancri* **H VI. 75.** No observation since 1782 but the following:

AB	1904.59	22°8	45″56	2*n*	β⁶	...11.0
AC	1904.59	295.2	109.28	2*n*	β⁶	...10.0

54 32 **4384.** **Σ 1173.** Apparently unchanged.

1867.04	51°0	10″08	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Δ (II)...]

55 11 **4388.** **Σ 1172.** Probably no change.

1867.05	243°5	1″70	3*n*	Δ
1878.84	245.9	1.74	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β³...]

55 16 **4389.** **H 4024.** Another measure by H is:

1837.0	81°1	10″65	1*n*	H³	8...9½

55 17 **4390.** **Hu 713.** With a later measure the mean is:

1903.86	129°2	4″78	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

55 53 **4396.** **Ho 349.** Later measures are:

1898.27	226°7	9″62	2*n*	Doo	8.5...11.0

[Ho (3233)...Doolittle (*Pub. Flower Obsy.* I)...]

56 1 **4399.** **OΣ 186.** Some of the measures are not very accordant, but on the whole there is no evidence of motion.

1870.05	72°2	0″82	5*n*	Δ
1877.22	74.0	0.78	4*n*	Sp
1898.09	73.4	0.78	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Du...Sp (**II**)...Per...Per (2685)...Flm...Δ (**I**)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

56 5 **4400.** **Σ 1174.** Unchanged,

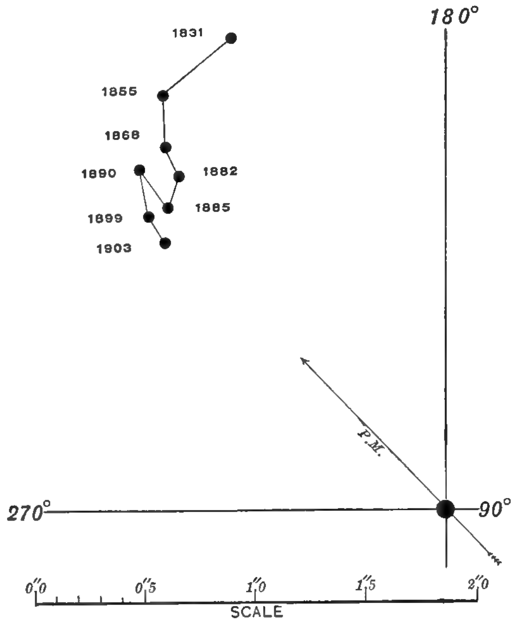
1869.30	213°7	5″59	4*n*	Δ
1901.11	215.0	5.40	1*n*	Espin

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Espin (*Mon. Not.* **LXIV**, 676)...]

56 6 **4402.** **Σ 1175.** The measures are somewhat discordant, but there is a slow advance in the angle, and a diminution in the distance.

1831.24	204°6	2″37	5*n*	Σ
1855.26	214.4	2.30	2*n*	Ma
1868.92	217.8	2.09	5*n*	Δ
1882.76	218.7	1.95	6*n*	En
1885.29	222°6	1″88	4*n*	Hl
1890.10	222.1	2.09	2*n*	T
1899.87	225.2	1.91	8*n*	Doo
1903.12	226.4	1.77	3*n*	Do

Boss gives 0″135 in 223°5 for the proper motion, and this is evidently common to both stars.



Σ 1175

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Δ (1735)...Δ (**II**)...Big...Flm...H (**V**)...Pt...β¹...En (2663)...T (2991, 3185)...Hl (*Wash. Obsns.* 1885)...Hl (**II**)...Lv¹...Gore (*Mon. Not.* **XLVII**, 61)...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LX**, 499; **LXIII**, 403; **LXIV**, 794)....Brown (3645)....Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3930)...]

4403. **β 333.** Discovered with the 6-inch. Apparently without change. Lalande 15720. C is Lalande 15721. The magnitudes are discordant: L 8½; SD 8.4; Cin.Z. 7.7. 56m 7s

A and B

1885.66	43°6	1″70	1*n*	Wilson
1893.22	39.4	1.45	2*n*	Sellors
1897.83	45.8	2.02	1*n*	See
1898.74	38.2	1.73	2*n*	Doo

A and C

1898.23	72°3	42″39	2*n*	Doo

[β (**VI**)...β (2062)...Cin⁴...Cin⁵...Wilson (Cin¹⁰)...Sellors (3240)...See (3495)...Doolittle (*Pub. Flower Obsy.* **I**)...Innes (*Mon. Not.* **LXIV**, 132)...]

4405. **β 23.** Discovered with the 6-inch. Probably unchanged. A faint pair in the field *n p*. 56 14

1891.97	181°9	2″62	3*n*	β	8.0...10.8
1898.12	178.0	2.48	2*n*	A	8.0...11.5

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....β (3114) (*Pub. L. O.* **II**)...Δ (**I**)....A (3584)...]

$56^m\ 29^s$ **4406.** **OΣ 187.** Probably binary, but the motion is extremely slow, and the period is probably many hundreds of years. The distance seems to have remained practically constant.

1848.32	299°.2	0″.35	4*n*	OΣ
1868.32	286.3	....	3*n*	Δ
1874.86	281.6	0.45	4*n*	Δ
1875.27	280.1	0.4±	6*n*	Sp
1882.24	276.6	0.26	5*n*	En
1887.20	274.1	0.3±	4*n*	Sp
1891.20	280.8	0.36	2*n*	Hl
1893.24	285.2	0.34	3*n*	Lewis
1899.70	265.9	0.30	6*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Se (probably OΣ 186) ... Se3 ... Flm ... Δ (I) ... Do (2322) ... Per ... Per (2685) ... Sp (**II**) ... Sp (**II**, App) ... Sp (2133) ... Hl (**II**) ... Lewis (*Mon. Not.* **LIV**, 315) .... Brown (3645) .... Hu (*Pub. L. O.* **V**) .... HΣ (**XII**) ...]

56 59 **4409.** **β 202.** Discovered with the 6-inch. No change.

A and B

1878.16	160°.4	7″.74	2*n*	Cin
1892.10	160.7	7.77	3*n*	β
1899.09	161.2	7.60	1*n*	β

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... β (3114) (*Pub. L. O.* **II**) ... Cin3 ... Cin4 Cin5 ... Wilson (Cin10) ... Lv (*Proc. Haverford Coll. Obsy.* 1892) (*A. J.* 278) ... See (3495) ...]

57 6 **4411.** **Howe 19.** Discovered by Howe at Cincinnati.

1902.18	331°.1	2″.49	1*n*	Innes

[Cin4 ... Innes (*Mon. Not.* **LXIV**, 132) ...]

57 12 **4412.** **See 95** Later measures at the Lowell Observatory make the distance smaller.

1899.96	191°.0	12″.34	2*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

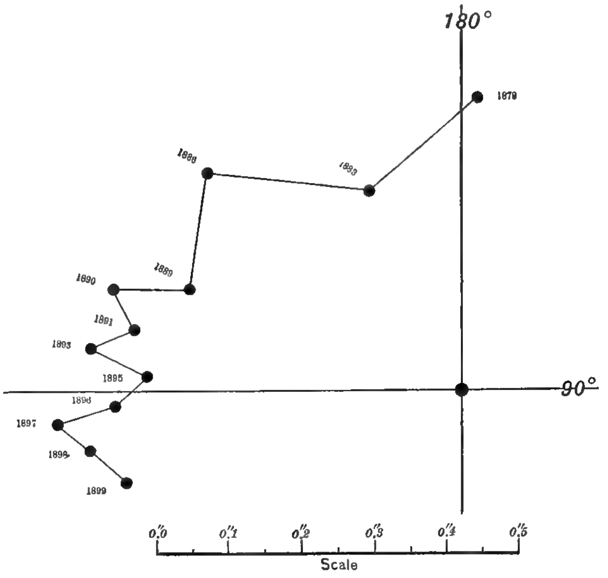
57 41 **4413.** **β 203.** Discovered with the 6-inch. No sensible change. A 9m star 64″ distant in 73°.7.

1879.09	243°.8	6″.94	1*n*	Cin
1883.11	245.2	7.15	1*n*	Wilson
1898.14	242.2	7.41	1*n*	See
1902.05	243.1	7.19	3*n*	Do

[β (**IV**) .... β (*Mon. Not.* **XXXIV**, 382) .... Cin3 .... Cin5 .... Wilson (Cin10) .... See ( ) ... Do (3798) called H 4037 ...]

57 43 **4414.** **β 581.** This most interesting triple system was discovered with the 18½-inch. The close pair is in rapid direct angular motion, with no sensible change in the distance. The third star, C, is also moving in the same direction more slowly. This system bears a close resemblance, in all respects, to ζ *Cancri*, except as to the magnitudes of the components. The principal positions of the close pair to 1899 are shown in the diagram.

The proper motion of this star, if any, is not large. Porter finds, from an examination of the meridian observations, that an annual proper motion of 0″.12 in the direction of 180° would best represent them, but from the lack of observations this value is not certain. Whatever the movement may be, it is evidently common to the three components.



β 581

The following are all the measures:

A and B

1878.15	176°.9	0″.40	2*n*	β
1878.22	180.3	0.40	1*n*	Δ
1883.37	205.2	0.30	5*n*	En
1886.26	229.6	0.46	2*n*	HΣ
1889.23	249.8	0.4±	4*n*	Sp
1890.21	253.7	0.5±	4*n*	Sp
1891.97	259.4	0.46	4*n*	β
1893.24	263.2	0.51	9*n*	Sp
1893.31	273.1	0.84	1*n*	Lewis
1893.93	266.0	0.55	1*n*	Barnard
1894.17	262.3	0.50	4*n*	HΣ
1894.27	266.8	0.47	4*n*	Sp
1895.22	267.9	0.43	3*n*	Sp
1895.24	266.8	0.50	1*n*	HΣ
1895.28	278.3	0.45	1*n*	Lewis
1895.28	271.9	0.34	3*n*	Com
1896.18	272.8	0.59	3*n*	Lewis
1896.24	272.9	0.37	3*n*	Com
1896.94	274.9	0.56	3*n*	A
1897.81	275.5	0.56	1*n*	β
1898.16	271.0	0.35	1*n*	Bowyer
1898.18	282.0	0.59	3*n*	Brown
1898.25	281.4	0.49	1*n*	Lewis
1898.27	278.0	0.45	1*n*	Sp
1899.21	286.2	0.48	3*n*	A
1899.16	272.9	0.37	1*n*	Bowyer
1899.99	285.3	0.56	2*n*	Doo
1900.19	286.1	0.35	3*n*	Bryant
1900.28	284.8	0.53	2*n*	Lewis
1900.91	289.7	0.44	3*n*	Doo
1901.19	291.3	0.28	3*n*	Bryant

1901.25	295°.4	0″.45	2*n*	A
1901.31	282.0	0.68	1*n*	Lewis
1902.20	294.4	0.48	3*n*	Lewis
1903.14	296.7	0.35	2*n*	Bryant
1903.14	287.0	0.54	1*n*	Lewis
1903.18	304.7	0.39	1*n*	Bowyer
1904.13	309.2	0.41	1*n*	Biesbroeck

AB and C

1878.13	185°.3	4″.76	3*n*	β
1878.22	184.3	4.76	1*n*	Δ
1886.25	189.5	4.36	1*n*	HΣ
1891.97	192.7	4.60	4*n*	β
1892.13	190.5	....	1*n*	Collins
1894.17	191.6	4.58	4*n*	HΣ
1895.24	192.3	4.60	1*n*	HΣ
1895.28	199.3	4.82	1*n*	Lewis
1896.18	197.0	5.13	3*n*	Lewis
1896.94	196.7	4.42	2*n*	A
1897.81	193.3	4.50	1*n*	β
1898.18	195.9	4.55	1*n*	Brown
1898.25	201.7	4.89	1*n*	Lewis
1899.02	192.5	4.83	1*n*	β
1899.21	193.9	4.70	3*n*	A
1899.99	192.5	4.58	2*n*	Doo
1900.96	195.5	4.72	4*n*	Doo
1901.25	194.0	4.82	2*n*	A
1901.31	200.0	5.57	1*n*	Lewis
1902.19	198.9	4.88	2*n*	Lewis
1903.14	193.3	4.44	1*n*	Lewis
1904.20	197.8	4.63	1*n*	Biesbroeck

[β (**X**) ... β^{1} ... β (*Mon. Not.* **LII**, 438) ... β (3114) (*Pub. L. O.* **II**) ... Δ (**I**) ... En (2678) ... Sp (**III**) ... Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... Com (*Pub. Washburn Obsy.* **X**) ... Barnard (*A. J.* 447) ... Brown (3645) ... HΣ (**XII**) ... A (3465, 3638) (*Bul. L. O.* No. 11) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**) ... Biesbroeck ...]

(See p. 1070)

57^{m} 47^{s} **4416.** Σ 1178. No change.

1869.17	327°.4	4″.89	4*n*	Δ

[Ma (*F. S.* **I**) ... H (**VIII**) ... Ma (**XII, XV**) ... Hd ... WS ... Gl ... Δ (**II**) ...]

58 1 **4417.** Σ 1169. (= **S** 562.) Without change. The proper motions from meridian positions are given in the *Hamburg Catalogue:*

A = 0″.126 in 225°.7
B = 0.067 in 225.5

This motion must be exactly the same for the two components.

1867.68	10°.6	20″.79	3*n*	Δ
1878.11	10.4	20.82	3*n*	OΣ
1889.24	10.1	20.71	1*n*	Toulouse

[Ma (*F. S.* **II**) ... Δ (1204) ... Δ (**I**) (**II**, pp. 114, 410) ... Big ... Hl (**I**) ... Ra (**XXVII**) ... En (2662) ... OΣ (**X**, p 203) ... Glasenapp (**III**) ... *Annals Toulouse Obsy.* **III** ...]

58 6 **4418.** **β** 582. (AB = **Σ** 1179.) The small companion to B of Σ 1179 was discovered with the 18½-inch. The change in AB is due to proper motion, probably of the brighter component. This movement appears to be about 0″.03 in a direction nearly opposite B.

B and C

1879.28	59°.1	3″.60	1*n*	Cin
1891.99	57.6	3.93	3*n*	β
1894.17	54.8	4.05	2*n*	HΣ
1896.14	58.0	4.39	1*n*	Lewis
1899.02	55.1	3.59	1*n*	β

A and B (= Σ 1179)

1829.73	205°.2	17″.91	2*n*	Σ
1864.90	204.6	19.16	5*n*	Δ
1878.09	204.5	19.75	2*n*	β
1881.18	203.8	19.73	1*n*	Big
1891.99	204.2	19.93	3*n*	β
1899.02	203.9	20.26	1*n*	β

[β (**X**) ... β^{1} ... β (3114) (*Ast. and A.-P.* **XIII**, 17) (*Pub. L. O.* **II**) ... Cin^{5} ... Lewis (*Mon. Not.* **LIX**, 400) .... Ma (*F. S.* **II**) .... En .... Big .... Pt .... HΣ (**XII**) .... *Annals Toulouse Obsy* **III** ...]

(See p. 1070)

4419. Σ 1176. The only measures are: 58^{m} 8^{s}

1866.97	27°.5	22″.38	3*n*	Δ
1900.59	28.3	22.29	2*n*	Espin

[Ma (*F. S.* **II**) ... Δ (**II**) ... Espin (*Mon. Not.* **LXII**, 528) ...]

4420. **β** 903. Discovered with the 18½-inch. Unchanged. 58 9

1879.27	28°.2	1″.48	1*n*	Cin
1892.11	32.8	1.54	3*n*	β

[β (**XIII**) ... β^{3} ... β (3114) (*Pub. L. O.* **II**) ... Cin^{5} ... Lv^{1} ... LM ...]

(See p. 1070)

4421. Σ 1177. *Cancri* 17. (= **H I.** 11 = **Sh** 88.) Apparently without change. 58 16

1869.03	352°.8	3″.33	4*n*	Δ
1889.15	354.2	3.61	8*n*	Giacomelli
1903.20	351.9	3.43	2*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**X, XII, XIII, XV**) ... H (**VII**) ... Bp ... Ba (**I, III**) ... Da^{3} ... Se ... Se^{2} ... Se^{3} ... Wr ... Wr (*Phil. Trans.* 1851) ... Ra (**XXIV**) ... Hd ... Δ (1119) ... Δ (**I, II**) ... Du ... Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Ma (324) ... Pl ... Lv^{1} ... Sp (**II**) ... Per ... Per (2684) ... Jones (*A. J.* 312) ... Giacomelli (**II**) ... Glasenapp (**II**) ... Knorre (3518) ... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ... Biesbroeck ...]

4425. Σ 1181. Probably fixed. 58 55

1867.72	139°.6	5″.21	3*n*	Δ
1895.34	140.1	6.16	1*n*	Leip
1905.12	138.7	5.20	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... Se^{3} ... Δ (**II**) ... *A. G. Leipzig*, p. 248 ... β^{6} ...]

4426. Σ 1182. *Canis Minoris* 61. Fixed. 59 1

1866.47	73°.0	4″.27	3*n*	Δ
1905.12	73.7	4.32	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se^{3} ... Δ (**II**) ... β^{6} ...]

4428. **A. G.** 147. Double in *A. G. Leiden.* Measures by β^{6}. 59 9

59m 20s **4429.** **H 2428.** The magnitude in DM is 7.6.

1900.11	67°.7	10″.90	2*n*	Es	8.5...11.7

[Espin (3717)...]

59 47 **4435.** **A. G. 148.** Double in *A. G. Nico.* Measures by β^5

59 49 **4436.** **H 4041.** "A most delicate and difficult object. The night is not such as to give perfect definition, although pretty good, so that although *I have no doubt*, I should like to see the star again under more favorable circumstances." I looked for this carefully with the 6-inch 1874–75 without finding any close star, and again in 1878 with the 18½-inch, and on two nights in 1903 with the the 40-inch. It is very probable that H was mistaken.

[Innes (*Mon. Not.* **LXIV**, 132)...β^6...]

0 0 **4437.** **Ho 351.** Probably unchanged.

1899.27	236°.5	2″.11	3*n*	A	7.3...12.2

[Ho (3223)...A (3638)...]

(See p. 1071)

0 7 **4438.** **Weisse 18.** "Duplex?" in Weisse. Examined with the 40-inch (1901.72); only two distant companions, too remote to be of any interest.

[β^5...]

0 41 **4440.** **A 543.** (A and BC = **Σ 1183.**) The smaller member of the Struve pair was discovered to be a close double by Aitken. No other measures of this. The wide pair is fixed.

1866.70	326°.8	30″.81	3*n*	Δ
1903.90	326.6	30.47	2*n*	A

[Ma (*F. S.* **II**)...H²...H (**IV**)...Ra (**XXIII**)...En...Δ (**II**)...Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...A (*Bul. L. O.* No. 50)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

0 41 **4441.** **A. G. 149.** Measures from *A. G. Leipzig*, p. 248.

0 55 **4444.** **Σ 1185.** Probably without change.

1868.45	101°.3	3″.76	3*n*	Δ
1905.07	98.6	3.40	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^6...]

1 29 **4447.** **11** *Cancri.* **Σ 1186.** (= **Sh 88.**) Fixed. The principal star has a proper motion of 0″.034 in 222°.0 (Auwers).

1869.22	217°.9	3″.25	4*n*	Δ
1903.12	218.3	3.28	3*n*	Do

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...H (**VII**)...Bp...Da³...Ba (**II, IV**)... Hd...OΣ (**IX**)...Δ (**II**)...Lewis (*Mon. Not.* **LXII**, 383; **LXIII**, 403)...Do (3930)...]

4448. **Σ 1184.** Fixed. B is DM (38°) 1869. Espin mentions a 14 m star, 210°: 18″. 1m 30s

1867.04	340°.6	26″.90	3*n*	Δ
1900.10	340.8	26.50	1*n*	Espin

[Ma (*F. S.* **II**)...Δ (**II**)...Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383)... Espin (*Mon. Not.* **LXIV**, 676)...]

(See p. 1071)

4449. *Argus* 285. **Dunlop 61.** This star is No. 61 of Dunlop's *Catalogue of Double Stars* (*Mem. R. A. S.* III). Dif. R. A. = 3s.05. There is some error in this place given from Dunlop. I have looked for this star several times, and am certain there is nothing in, or near this place. No bright star near. The nearest pair I could find at all corresponding was H 4035 (*Argus* 274) 131°.7 : 30″±: 7½...9. This is, R. A. 7h 58m 24s; Decl. −32° 7′. 1 30:

4450. **Σ 1189** *rej.* The only measure is the following: 1 48

1905.18	335°.2	8″.62	1*n*	β^6	8.2...10.5

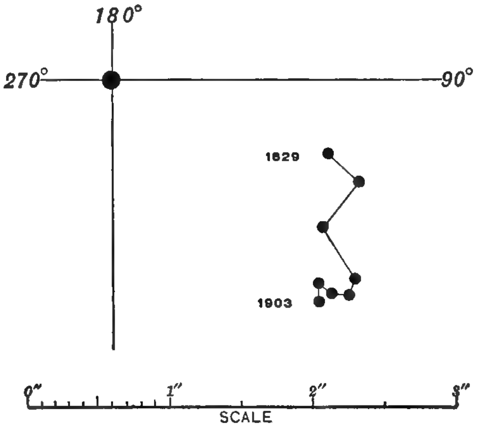
4451. **Σ 1188.** (= **H 439.**) No change. 1 54

1866.80	201°.5	16″.00	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...]

(See p. 1071)

4452. **Σ 1187.** *Lyncis* 85. There is little doubt of this being a binary system, but the motion is very slow and practically rectilinear. 1 54



Σ 1187

1829.50	71°.0	1″.61	5*n*	Σ
1844.30	67.7	1.89	2*n*	OΣ
1866.74	55.1	1.84	6*n*	Δ
1875.31	50.9	2.22	4*n*	Sp
1890.27	47.8	2.27	3*n*	Maw
1893.14	45.8	2.17	4*n*	Lewis
1897.92	45.3	2.05	2*n*	Hu
1903.27	42.9	2.13	4*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**X, XI, XIII, XV**) ... H¹ ... Wr ... WS ... Gl ... Du ... Se ... Se³ ... Flm ... Je (2346, 2449) ... Sk ... Sp (2133) ... Sp (**II**) ... Per ... Per (2684) ... Pt ... Seagrave (*Sid. Mess.* **II**, 22) ... OΣ (**IX**) ... Do (2197, 2199, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Big ... Maw (**I**) ... En (1673, 2663) ... Δ (1110, 1256, 1474, 1735, 2192) ... Δ (**I, II**) ... Hl (**I, II**) ... T (2991) ... Jones (*A. J.* 312) ... Big (*Bul. Ast.* **XII**, 299) ... Collins (*A. J.* 378) ... Knorre (3300, 3518) ... Ebell (3321) .... Hu (*A. J.* 427) .... Coleman (*Mem. R. A. S.* **LIII**) .... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794) ... HΣ (**XII**) ... Je (3802) ... Sk⁵ ... Biesbroeck ...]

2m 3s **4453.** **β 334.** Discovered with the 6-inch. Apparently fixed.

1894.23	352°3	2″55	1*n*	Sellors
1897.83	352.5	2.90	1*n*	See
1903.17	352.1	2.80	2*n*	Scott

[β (**VI**) ... β (2062) ... Cin⁴ ... Cin⁶ ... Sellors (3303) ... See (3496) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

2 21 **4454.** **H 3308.** L 15882. In Heis 6-7 m; erroneously called L 15862. The principal star has a considerable proper motion:

Stumpe	0″326 in 141°5
Porter	0.328 in 138.1

The only observation of the companion since Herschel is:

1901.74	263°3	45″74	3*n*	β⁵	7.0 ... 10.8

2 26 **4455.** *ρ Argus.* **Hd 113.** Suspected double by Winlock; in Hd, "doubtful: components equal." It has never been seen double since, and probably is not double.

2 34 **4456.** 29 *Monocerotis.* **Σ 1190.** (= **H IV. 97** = **Sh 89.**) All recent observers rate B much brighter than Struve. No change in the Σ stars. The large star has a proper motion of 0″044 in 294°0 (Auwers).

A and B

1867.88	104°8	31″72	3*n*	Δ	... 10.0
1877.80	104.7	31.63	5*n*	Je	
1905.06	105.1	31.92	2*n*	β	

A and C

1867.88	244°8	66″63	3*n*	Δ	... 8.3
1877.65	244.7	67.06	7*n*	Je	
1905.06	245.3	66.07	2*n*	β	

There is a faint star nearer than C.

1905.03	281°7	40″32	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... H (**VII**) ... En ... Je (2279, 2346) ... Δ (**II**) ... *Annals Toulouse Obsy.* **III** ... β⁶ ...]

3 9 **4458.** **S 563.** The magnitudes are greatly overrated by South. In SD the magnitudes are 7.8 and 8.3. The 40-inch shows a faint attendant to B.

AB	1903.19	56°4	134″28	3*n*	β⁶	7.5 ... 8.0
BC	1903.19	300.0	7.80	2*n*	β⁶	... 13.5

4459. **β 583.** Discovered with the 18½-inch. Without change. 3m 18s

1878.26	67°5	1″71	1*n*	Δ	9.5 ... 10.0
1892.11	69.5	1.70	3*n*	β	8.9 ... 9.1
1903.17	69.1	1.75	2*n*	Scott	

[β (**X**) .... β¹ .... β (3114) (*Pub. L. O.* **II**) .... Δ (**I**) .... Cin⁵ .... Scott (*Mon. Not.* **LXIV**, 52) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

4461. **H 2430.** The only later observations are from β⁵: 3 49

AB	1901.77	310°3	20″40	2*n*	β	8.9 ... 12.0
BC	1901.77	182.1	8.37	2*n*	β	... 12.5

The magnitude of A in DM is 9.2.

4462. **A. G. 150.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 3 49

4463. **Σ 1191.** Unchanged. 3 52

1868.32	71°5	3″32	3*n*	Δ
1901.66	72.4	3.22	2*n*	Ku

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Kustner (3821) ...]

4467. **Σ 1194.** Probably no sensible change. 4 14

1868.50	319°1	3″19	3*n*	Δ
1905.06	320.3	2″88	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... β⁶ ...]

4469. **O. Stone 18.** Unchanged. 4 40

1903.16	261°0	3″30	2*n*	Scott

[Cin³ ... Cin⁴ ... Cin⁵ ... Wilson (Cin¹⁰) ... Lunt (*Mon. Not.* **LXI**, 588) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

4471. **H 777.** *A. G. Leipzig,* p. 208, has 354°: 15″: 9 ... 11.5. 4 55

(See p. 1071)

4474. **Σ 1198.** (= **S 564.**) No sensible change. 5 4

1867.12	157°2	33″47	3*n*	Δ
1905.06	157.2	33.30	2*n*	β

[Ma (*F. S.* **I**) ...... En ... Δ (**II**) ... *Annals Toulouse Obsy.* **III** ... β⁶ ...]

4475. **Σ 1195.** Unchanged. Distant 13 m star added by Ho, 153°0: 21″78 (1892.26) 2*n*. 5 10

1868.45	330°9	8″45	4*n*	Δ
1892.26	331.8	8.63	2*n*	Ho

[Ma (*F. S.* **I**) ... Δ (**II**) ... Ho (3234) ...]

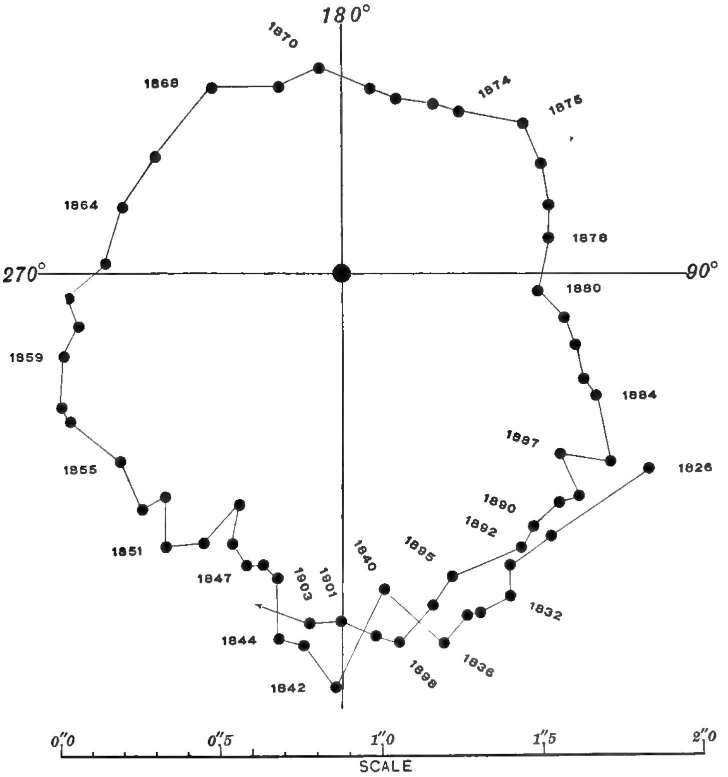
4476. **Σ 1197.** Apparently fixed. 5 18

1870.05	101°6	1″76	4*n*	Δ
1874.02	102.5	1.62	6*n*	Du

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Δ (**II**) ... Du ...]

$5^m 20^s$ **4477.** *ζ Cancri.* **Σ 1196.** (= ♅ I. 24 = ♅ III. 19 = Sh 90.) A well-known triple system. The orbit of the close pair is as accurately determined as that of any observed binary. More than one revolution has been completed since the measures of Struve. Commencing with 1826 we have a nearly continuous series of measures by the best observers down to the present time. The only way to improve the elements of the orbit is to confine the investigation to observations of this character, rejecting altogether from consideration the great mass of micrometrical work, which is more or less incomplete, and uncertain in value. It seems unnecessary to give here even a selected number of the best measures. On the accompanying diagram the following positions are shown:

1826–1836	Σ	1880–1890	Hl
1840–1874	OΣ	1892	β
1875–1878	Δ	1897–1903	A, Hu



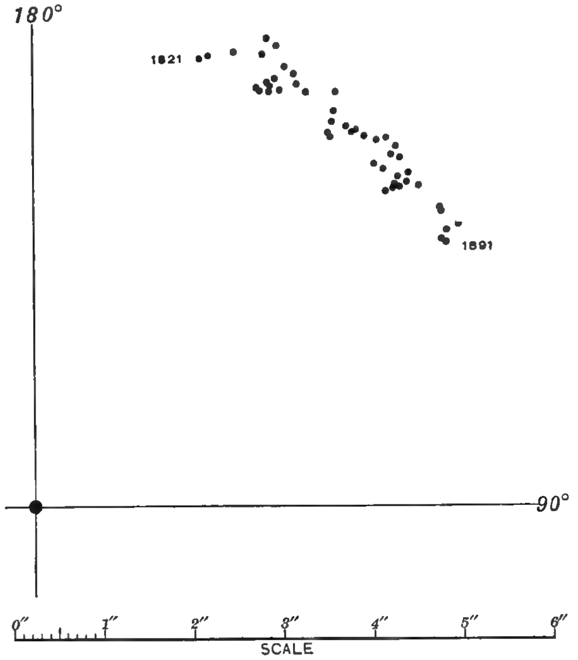
ζ Cancri. A and B

The following orbits have been computed, the date of the last measure used being given in the first column:

Orbits

1842	Madler	58.91	*Dorp. Obsns.* IX, 176
1847	Madler	58.27	*F. S.* I. 245
1849	Villarceau	42.50	*A. N.* 967
1855	Winnecke	58.94	*A. N.* 967
1869	Plummer	58.23	*Mon. Not.* XXXI, 195
1872	Flammarion	60.45	*Étoiles doubles et multiples*
1874	O. Struve	62.4	*Comp. Rend.* LXXIX, 1467
1880	Doberck	59.48	*A. N.* 2322
1881	Seeliger	60.3	*Wien. Akad.* LXXXIII
1888	Seeliger	59.11	*Akad. d. Wiss.*, Munich, 1888
1895	See	60.0	*Evolution of the Stellar Systems*

The third star, C, has a slow retrograde motion about AB, the mean annual motion being about 0°5, with no sensible change in the distance. The diagram shows 52 yearly positions of this star between 1821 and 1891 by four of the leading observers:



ζ Cancri. A B and C

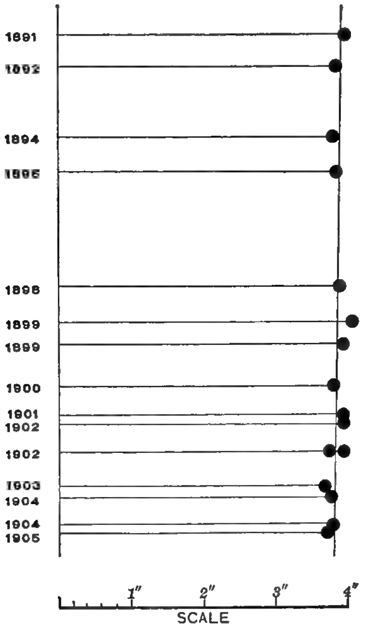
1821–1836	Σ	8	1875–1878	Δ	4
1840–1874	OΣ	29	1880–1891	Hl	11

While there is no question of the change being due to orbital motion, it will be seen that the observed positions give practically rectilinear motion.

The triple system has a proper motion of 0″114 in 155°7 (Auwers).

From an apparent variability in the motion of C shown in the measures connecting it with A and B, it was suspected by OΣ that a fourth disturbing body, closely connected with C, might exist. This matter was investigated by Seeliger, who satisfied himself that the apparent irregularities in the movement of C would be explained by assuming a fourth dark star D, forming a close pair with C, and the two revolving about their common center of gravity in 17.6 years. I have undertaken to show in a paper entitled "Invisible Double Stars," that whatever the fact may be as to any undiscovered member of this system, and without calling in question the existence of such a body, the evidence relied upon is wholly insufficient at this time to warrant any such conclusion, since the same apparent irregularities are found in all double stars where the annual movement is less than the error of the micrometrical measures. Under such conditions there is necessarily a tendency in the observed positions to arrange themselves in groups, more or less regular, and in all the other instances the natural and obvious explanation based upon the ordinary errors of observation has been deemed sufficient.

I have also pointed out a method by which it can be determined whether or not the motion of C is really variable, and that is by comparing it with some star outside the system, thus eliminating all the sources of error which enter into measures connecting it with a close double star. For this purpose I commenced a series of measures of the difference in declination of C and B. A. C. 2759 (= β 1243) a 7 m star 2^{m} following *ζ Cancri*. These observations have been continued for about fourteen years by Barnard and myself with the large refractors of the Lick and Yerkes observatories. It will be seen that these measures give no evidence of any change or variation in the position of C, with reference to the comparison star. In fact, the observed positions are remarkably consistent, the differences being less than the ordinary or average errors of observation.



ζ Cancri
C and B.A.C. 2759

1891.23	104″.00	4*n*	β
1892.11	103.87	5*n*	β
1894.17	103.84	4*n*	Bar
1895.10	103.87	3*n*	Bar
1898.30	103.90	3*n*	β
1899.26	104.08	4*n*	Bar
1899.90	103.97	2*n*	Bar
1900.99	103.80	5*n*	Bar
1901.87	103.97	3*n*	Bar
1902.04	103.97	4*n*	β
1902.80	103.97	6*n*	Bar
1902.87	103.76	5*n*	β
1903.86	103.67	5*n*	Bar
1904.10	103.78	5*n*	β
1904.91	103.78	4*n*	Bar
1905.05	103.74	2*n*	β

The principal papers relating to the invisible star are:

[OΣ (*Comp. Rend.* **LXXIX**, 1463)...Seeliger (*Sitzungsberichten Wien* **LXXXIII**, 1018) (*Denkschrifton*, Munich, **XVII**)....β (*Mon. Not.* **LI**, 389)....Seeliger (3051, 3165)...β (*Mon. Not.* **LIII**, 40)...β (*Ast. and A.-P.* **XII**, 872)...Seeliger (*Bavarian Acad. Sci.* 1894, p. 257) (*Ast. and A.-P.* **XIII**, 802)...]

General references:

[Ma (*F. S.* I)...Ma (**IX, X, XI, XIII, XV**)...Ma (303, 324, 430, 452)...BM (280) ...Bes...Bp...Auwers (1393)...J^{2}...J^{3}...WJ^{2}...Fl...P^{1}...P^{2}...K... H (*Mem. R. A. S.* **V**, 221)...H (**V, VII**))...H^{1}...H^{2}...K (409, 1519)...Wn (**V**)...Wn (967, 1738)...OΣ (411)...Bond (*Am. Acad. Sci.* **II**, 144)...En... En (1518, 1673, 2742, 2786, 2663)...Da^{1}...Da^{2}...Da^{3}...Da^{4}...Da (*Mon. Not.* **II**, 34)...Se (975, 1072, 1614)...Se...Se^{2}...Se^{3}...Se (*Comp. Rend.* **XLI**, 271 ...Lu (**II, III**)...Ba (**I, II, III, IV**)...Gl...WS...WS^{2}...Kn...Hd...Wilson (*Mon. Not.* **XXXIII**, 412)....Burton (*Mon. Not.* **XXXIV**, 125)....*Bul. Hebdomadaire Assoc. Sci.* 1875, p. 217)....Δ (1026, 1110, 1185, 1256, 1474, 1572, 1755, 1798, 1886, 1979, 2079, 2192)...Δ (**I, II**)...Δ (*Mem. Accad. Sci.*)...Du ...Sp (2133)...Sp (**II**)...Sp (**II**, App.)...Kustner (2584)...Franz (2590)... Wr....Do (2197, 2199, 2322, 2433, 2989, 3378, 3680, 3798, 3799, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Bru^{2}...Flm...Pl...Pk...Sk...Sk^{2}...Sk^{3}... Sk^{4}...Sk^{5}...Pt...Lv^{1}...T (2866)...Per...Per (2684)...Harzer (2758–59, 2764, 2775)...Perry (*Ast. Reg.* **XIX**, 176)...Maw (*Observatory* **XII**, 156)... Clerke (*Sid. Mess.* **IX**, 300)...Collins (*Proc. Haverford Coll. Obsy.* 1891)... Jones (*Proc. Haverford Coll. Obsy.* 1892)...Plummer (*Mon. Not.* **XXXI**, 194) ....Big....Com (**VI**)....Engelhardt (2801)....Hl (*A. J.* 265)....Hl (*Wash. Obsns.* 1880–86)...Hl (**I, II**)...Ra (**XXI, XXII, XXXVIII**)...Je (2346, 2449, 2772)...$β^{2}$...β (2930, 3141)...$β^{3}$...β (*Pub. L. O.* **II**)...OΣ (**IX, X**, p. 159) ...Knorre (*Beob. Berlin*, No. 6, 1892)...Wilson (*Mon. Not.* **XXXII**, 270... Jones (*A. J.* 312)...Sp (**III**)...Holmes (*Brit. Ast. Ass'n* **V**, 78)...Engelhardt (**II, III**)...See (*A. J.* 349, 378)...Glasenapp (**II, III**)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)... Com (*Pub. Washburn Obsy.* **X**)...Knorre (3300)...Ebell (3321)...See (*Evolution of the Stellar Systems*)...Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I**) ...Knorre (3518)...Ho (3558)...Maw (**I, III, IV**)...Solá (3563)...Coleman (*Mem. R. A. S.* **LIII, LIV**)...Brown (3645)...HΣ (**XII**)...Je (3802)...Gl (*Mon. Not.* **LXI**, 556)....*Annals Toulouse Obsy.* **III**....Salet (*Bul. Ast.* **XXII**, 108)...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 794)...Hu (*A. J.* 379, 427)... A (3465, 3584, 3638) (*Bul. L. O.* No. 11) (*A. J.* 429)...Biesbroeck...$β^{6}$...]

4480. 19 *Argus.* **β 1064.** (AD = **♅ IV. 26** = **Sh 291** = **σ 91.**) The close star was discovered with the 36-inch. All the measures of the distant star, D, are given. The large star has a proper motion of 0″.050 in the direction of 295°.9 (Auwers). The faint star C was noted by Aitken. $5^{m}\ 39^{s}$

		A and B		
1898.31	246°.0	2″.88	1*n*	A
1899.26	244.2	2.31	1*n*	β
1899.91	252.9	2.24	2*n*	A
		A and D (= ♅ IV. 26 = Sh 91)		
1889.08	255°.8	70″.67	3*n*	β
1898.27	256.1	71.85	1*n*	A
1898.96	256.0	71.44	1*n*	β

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...A (3638)...]

4481. **Σ 1192.** Error in *Pos. Med.* of $1^{m}\ 28^{s}$ R. A. and 10′ Decl. No change in either companion. 5 43

		A and B		
1868.80	257°.6	2″.81	3*n*	Δ
1905.12	256.6	2.62	1*n*	β
		A and C		
1868.80	223°.3	48″.70	3*n*	Δ
1905.12	222.8	48.63	1*n*	β

[Ma (*F. S.* I)...Ma (**XI, XV**)...Bl (**V**)...Δ (**II**)...$β^{6}$...

6m 8s **4483.** **A. G. 151.** Double in *A. G. Leiden.* Measures by β^6.

6 21 **4486.** **Σ 1201.** Without change.

1866.69	181°3	6″46	3*n*	Δ
1901.89	181.9	6.61	1*n*	Hu

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Δ (**II**)...*A. G. Leipzig* p. 208...]

6 33 **4488.** **Ho 38.** Discovered by Hough with the 18½-inch. Later measures are:

AB	1904.02	80°7	7″37	2*n*	β	8 ...12.2
AC	1904.02	139.3	29.97	2*n*	β	
CD	1904.02	218.8	7.39	2*n*	β	12.2...13.7

[Ho (2778)...β^6...]

6 34 **4489.** **OΣ 189.** No motion.

1867.60	293°7	4″21	3*n*	Δ
1898.23	292.2	4.35	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**II**)...Hu (*Pub. L. O.* **V**)...]

6 35 **4490.** **H 4050.** "Distance set down as 2″, but it is probably a mistake of writing for 20″, as the diagram makes the stars distant." Examined and found to be 300°: 20″ (1877.3). The companion is SD (15°) 2309.

1903.18	303°8	22″94	2*n*	β^6	8.5...8.6

6 44 **4491.** Measured in looking for Σ 1203 *rej.* (No. 4500).

[β^6...]

6 59 **4492.** **Σ 1202.** Struve's first series of three measures showed a rapidly decreasing angle, but a later measure gave a reverse motion. The observations since are not very accordant, but there seems to be some change in the angle.

1836.19	337°4	2″28	1*n*	Σ
1848.31	332.3	2.36	3*n*	Ma
1867.61	326.5	2.41	5*n*	Δ
1872.26	326.5	2.49	2*n*	OΣ
1882.19	327.3	2.54	1*n*	β
1885.30	322.3	2.31	4*n*	Hl
1903.17	320.6	2.43	4*n*	Do

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...Da³...OΣ (**IX**)...Hd...Gl...Du...Se...Se²...Se³...WS...WS²...Flm...Sk...Sk²...Δ (1474)...Δ (**II**)...Per...Per (2684)...En (2663)...Hl (*Wash. Obsns.* 1885)...Hl (**II**)...β^3...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 500; **LXII**, 383; **LXIV**, 794) HΣ (**XII**)...Sk⁵...Do (3930)...Furner and Storey (*Mon. Not.* **LXIV**, 445)...]

7 0 **4493.** **Σ 1199** *rej.* Measures from H (IV). The magnitude in DM is 8.6. This star has a proper motion of 0″06 in 180° (*A. G. Harvard*).

1902.73	1°3	25″16	1*n*	Hu

4494. **β 204.** Discovered with the 6-inch. No motion. 7m 2s

1877.25	305°0	0″95	1*n*	OΣ
1879.13	304.1	0.99	1*n*	β
1886.21	298.4	1.40	1*n*	HΣ
1889.11	304.2	1.01	1*n*	Lv
1892.75	302.7	0.85	6*n*	Sp

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β^3...OΣ (**X**)...Δ (**I**)...Lv¹...Sp (**III**)...HΣ (**XII**)...]

4496. **Pritchett.** From *Pub. Morrison Obsy.* I. No magnitudes given. 7 6

1902.49	343°5	1″27	2*n*	β^6	8.5...9.2

4497. **Σ 1200.** Without change. 7 9

1869.16	179°9	8″19	4*n*	Δ
1902.22	179.3	8.39	3*n*	Hu

[H²...Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...]

4499. *Cancri* **37.** **β 1243.** (AC = **H VI. 78** = **σ 292.**) 7 19
Discovered with the 36-inch. It is 2m *f* and 104″ *n* of ζ *Cancri*, and is the star which I suggested (*Mon. Not.* April 1891) would be suitable to compare with C of ζ *Cancri* to determine whether the latter has any variable motion due to the presence of an invisible star. In measuring this difference of declination, the very minute companion given here was detected. So far the measures show no certain change. The principal star has a small proper motion, 0″033 in the direction of 334°6 (*A. G. Berlin*).

The distant star C, making H VI. 78, was not measured by Herschel, being merely noted as Class VI.

A and B

1894.15	343°2	1″38	2*n*	Barnard
1898.29	348.4	1.40	1*n*	β
1903.21	346.5	1.03	1*n*	Lewis

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**, pp. 66, 225)... Barnard (*A. J.* 447)...Lewis (*Mon. Not.* **LX**, 500; **LXIV**, 794)...]

4500. **Σ 1203** *rej.* The only measures are: 7 25

1903.96	237°5	18″95	2*n*	β^6	8.4...11.5

4501. **Σ 1193.** The distance is decreasing, evidently from a small proper motion. 7 28

1867.36	85°5	43″88	3*n*	Δ
1879.06	85.6	43.77	1*n*	Do
1904.43	86.6	43.41	2*n*	β

[Ma (**XI**)...H (**V**)...Δ (**II**)...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^6...]

(See p. 1071)

$7^{m}\ 31^{s}$ **4502.** **β** 1244. Discovered with the 36-inch. The later measures do not show any certain motion.

1892.88	51°1	0″70	1*n*	J
1893.22	49.6	0.70	2*n*	Sp
1894.25	48.0	0.73	3*n*	Sp
1896.27	40.1	0.65	1*n*	Lewis
1897.29	46.9	0.82	4*n*	A
1901.17	41.4	0.68	4*n*	Bryant

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892) ...A (3465)...Sp (**III**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 500; **LXII**, 383; **LXIV**, 795)...]

7 42 **4505.** **OΣ** 188. Unchanged.

1869.78	193°5	10″48	4*n*	Δ
1898.27	193.2	10.65	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

(See p. 1071)

7 45 **4506.** **H** 2435. The only measures are:

1880.59	207°0	7″00	2*n*	β^{3}	9.2...9.3

Three wide pairs in this cluster are given from Hd (Nos. 4509–11).

7 52 **4507.** **β** 904. Discovered with the 18½-inch. One of the brighter stars of the large cluster, Dreyer 2548.

1892.18	80°2	3″18	4*n*	Lv, C

[β (**XIII**)...β^{3}...Lv and Collins (*Proc. Haverford Coll. Obsy.* 1892)(*A. J.* 278)...]

(See p. 1071)

7 58 **4508.** **Σ** 1204. Unchanged.

1866.93	102°7	11″47	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

8 4 **4512.** **H** 779. The following is in or very near this place, and is probably the Herschel star:

AB	1903.89	301°8	20″72	2*n*	β^{6}	9.9...10.0
AC	1903.89	130.0	21.52	2*n*	β^{6}	...10.3

There are two faint stars nearer A than those measured.

8 15 **4513.** **Σ** 1206. Substantially unchanged.

1868.42	200°5	12″81	4*n*	Δ
1905.03	200.5	12.83	1*n*	β

[Ma (*F. S.* **I**)...H (**VII**)...Δ (**II**)...β^{6}...]

8 36: **4514.** **ℌ** II. 87. (= σ 293.) No pair found in this place. In looking for this, β 583 was discovered. It is possible that that star is the one observed by ℌ, there being an error of 5^{m} in the R. A., but the angles do not correspond. (See No. 4459.)

$8^{m}\ 54^{s}$ **4516.** **Σ** 1207. The distance is increasing. The 40-inch shows a new companion, about the same distance from A.

AB	1869.12	191°6	11″04	4*n*	Δ	8.6...10.4
	1904.29	191.3	11.88	3*n*	β	8.6...10.5
AC	1904.29	68.7	12.63	3*n*	β	...12.3

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

8 55 **4517.** **β** 1196. This is 63^{s} *f* a 6 m star, and 40″ *n*. Discovered with the 36-inch. In DM 9.2 m.

1899.17	55°2	0″29	1*n*	A

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3638)...]

9 15 **4521.** **Σ** 1209 *rej.* Measures from β^{6}. B is DM (8°) 2015.

9 33 **4524.** **Σ** 1210. Fixed.

1867.82	113°2	15″50	4*n*	Δ
1893.18	112.9	15.13	2*n*	Gla

[Ma (*F. S.* **I**)...H (**V**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...]

9 50 **4526.** **Σ** 1205. Change doubtful.

1840.30	188°8	0″88	2*n*	OΣ
1844.29	188.8	1.00	1*n*	Ma
1869.64	178.9	0.98	5*n*	Δ
1899.28	175.9	0.98	1*n*	Bryant
1902.04	175.2	1.16	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Δ (**II**)...Bowyer and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 500...]

10 0 **4529.** **β** *Cancri.* **β** 1065. The faint companion was detected with the 36-inch. Auwers gives 0″074 in the direction of 237°2 as the proper motion of β *Cancri.* The companion seems to be moving with it, but further measures are necessary to make this certain.

1898.27	293°6	29″38	2*n*	A	3.5...13.8
1898.94	294.8	28.99	3*n*	β	...13.6
1904.91	294.6	29.06	3*n*	β	

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...A (3584)...β^{6}...]

10 3 **4530.** **H** 781. The only measures are from the Kirkwood Observatory.

1904.60	322°8	6″13	3*n*	Miller	9.0...9.1

10 23 **4531.** **Σ** 1211. There seems to be change in the distance. The components have a common proper motion of 0″237 in 214°6 (Porter), and probably make a physical pair. Doolittle measures a 12.7 m star, 1°0 : 27″12 (1898.29) 3*n*.

1869.64	129°9	1″44	4*n*	Δ
1896.80	127.0	0.79	2*n*	Lewis
1898.29	129.7	0.95	5*n*	Doo
1901.23	133.3	1.17	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXII**, 383)...]

10^m 23^s **4532. Hd 118.** Identified and measured:

1903.21	9°.4	5″.78	2*n*	β^6	9.7...9.7

10 35 **4533. Σ 1212.** (= **H 443.**) Without change.

1866.89	236°.7	5″.44	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...WS...Gl...Δ (**II**)...]

10 59 **4537. β 905.** Discovered with the 18½-inch. Relatively fixed.

1883.86	13°.7	3″.75	2*n*	W
1888.57	11.0	4.06	2*n*	Lv
1898.26	12.2	3.92	3*n*	A

[β (**XIII**)...β^3...Wilson (Cin^{10})...Lv^1...Jones (*A. J.* 312)...A (3584)...]

11 0 **4538. β 102.** Discovered with the 6-inch. No change.

1892.08	120°.8	3″.30	3*n*	β

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β (3141)(*Pub. L. O.* **II**)...Δ (**I**)...]

11 4 **4539. β 454.** Discovered with the 6-inch. No evidence of motion.

1892.20	16°.3	2″.41	3*n*	β	8.1...9.4
1892.26	16.6	2.49	2*n*	Lv	7.8...9.8
1898.27	16.0	2.49	1*n*	See	

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β (3141)(*Pub. L. O.* **II**)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...See ( )...Scott (*Mon. Not.* **LXIV**, 52)...]

11 8 **4540. Hn 95.** No other measures.

[*Pub. Washburn Obsy.* **II, VI**...]

11 23 **4545. β 906.** Discovered with the 18½-inch. Fixed. Near β 905.

1884.12	189°.1	3″.27	1*n*	W
1898.26	188.1	3.42	1*n*	See
1898.26	187.4	3.42	3*n*	A

[β (**XIII**)...β^3...Wilson (Cin^{10})...See ( )...A (3584)...]

11 32 **4547. Σ 1213.** Distance seems to be too large in Struve and Madler. There has been no change since 1867.

1845.20	326°.4	9″.99	1*n*	Ma
1867.74	324.0	7.26	3*n*	Δ
1878.22	325.1	7.43	1*n*	β
1905.05	320.2	7.18	3*n*	β

[Ma (*F. S.* I)...Δ (2194)...Δ (**II**)...Flm...β^1...Pt...β^6...]

11 36 **4549. G. Anderson 4.** (AC = **Σ 1208.**) The small star B was discovered by Geo. Anderson with the Washington 26-inch in 1877. No other measures. No change in the Σ stars.

1867.44	322°.8	20″.07	3*n*	Δ
1902.17	323.5	20.29	3*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Hn (*Wash. Obsns.* 1877)...β^6...]

11^m 50^s **4550. OΣ (App) 91.** No change.

1885.73	224°.4	92″.61	5*n*	Franz

[Δ (**I**)...Franz (3080)...]

12 26 **4551. Howe 22.** No motion.

1902.17	118°.1	3″.26	2*n*	Innes

[Cin^4...Cin^6...Wilson (Cin^{10})...Innes (*Mon. Not.* **LXIV**, 132)...]

12 26 **4552. Hu 224.** (ACD = **OΣ 190** *rej.*) The nearest companion was discovered by Hussey with the 12-inch at Mt. Hamilton. There seems to be no change in the distant stars. C is Rad.[1] 2127.

A and B

1901.80	316°.8	4″.09	2*n*	β

A and C

1898.27	167°.6	38″.72	3*n*	Hu
1901.80	167.5	38.50	2*n*	β

A and D

1898.27	280°.4	78″.11	3*n*	Hu
1901.80	280.4	77.65	2*n*	β

[Ma (**XI**)...Δ (I)...Espin (*Mon. Not.* **LXII**, 532)...Hu (*A. J.* 494)(*Pub. L. O.* **V**)...β^5...]

13 0 **4554. H 2441.** The distance of C is largely in error. C is O. Arg. S. 8352, 3^s.1 *f* A, and 47″.6 *s*. Recently measured:

AB	1904.03	140°.4	13″.93	2*n*	β^6	8.9...11.5
AC	1904.03	152.0	55.12	2*n*	β^6	.. 8.9

13 10 **4555. H 4072.** "Two or three companions besides." This is SD (19°) 2348 (8.9).

1882.12	172°.7	13″.92	1*n*	W	8.5...12.0
1904.03	165.4	13.32	2*n*	β	9.0...11.5

[Wilson (Cin^{10})...β^6...]

13 12 **4556. β 1320.** The close pair was found with the 40-inch. The wide pair is mentioned in *Cape Observations*, where it is called Σ 1214. That star was rejected by Struve as not afterwards found. He is not likely to have observed so faint a pair. There are no other measures. The close pair is a difficult object to measure.

[β^6...]

13 59 **4561. β 576.** Discovered with the 18½-inch. By a clerical mistake, the place of this star was given in β (X) with an error of 1^h in R. A. and 1° in Decl. The correct place is given here. The only later measure is:

1899.02	147°.9	1″.37	1*n*	β

[β (**X**)...β^1...HΣ (**XII**, p. 187)...β (*Pub. Y. O.* I)...]

14^{m} 4^{s} **4562.** **β 907.** This close pair of small stars is 11^{s} *p* and 99″ *n* of a 7 m star. Discovered with the 18½-inch.

The only later measures are:

1892.18	55°2	0″88	3*n*	β
1899.26	52.1	0.82	1*n*	β

[β (XIII)...β^3...β (3141) (*Pub. Y. O.* I)...]

14 7 **4563.** **Arg. 18.** "Duplex, Cl. III," in O. Arg. Examined and estimated as given (1876). Recently measured:

1905.12	22°8	19″69	1*n*	β^6	9.0...9.1

14 14 **4565.** **OΣ (App) 92.** No change.

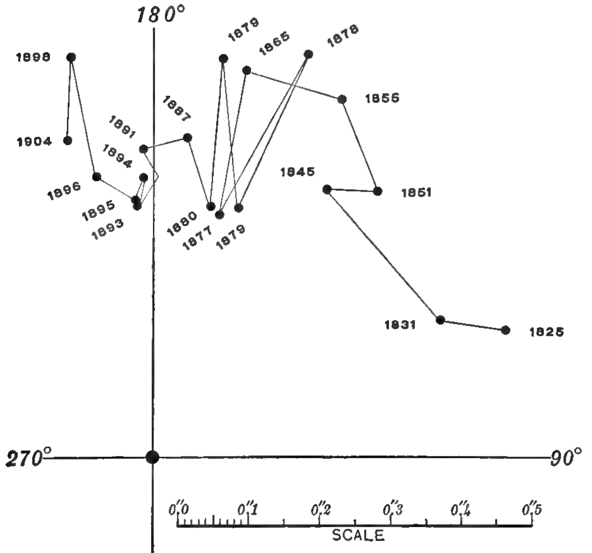
1883.45	179°7	57″88	5*n*	Franz

[Δ (I)...Franz (2649)...]

14 33 **4567.** **Σ 1215** *rej.* Place and measures from H (VI). Herschel's place is that of the 8.3 m star, DM (1°) 2070. A recent examination shows that that star has no companion, and that the pair measured by H is a faint pair in the field directly north. It is hardly likely that so faint a pair would be noted by Struve, but nothing else was found in the immediate vicinity.

1905.07	345°8	12″95	1*n*	β^6	10.5...10.5

15 15 **4570.** **Σ 1216.** Probably a binary, but the motion is slow in angle, and change in distance is very uncertain. The measures, taken together, are discordant, particularly in distance. A diagram, showing all the complete measures to 1896, is reproduced here from *Popular Astronomy*, January, 1898, with some of the later positions added. It is probable that the observations of another century will be required to definitely determine the elements of the orbit.



Σ 1216

Some of the measures are:

1831.24	115°2	0″45	4*n*	Σ
1845.18	146.9	0.45	5*n*	Ma
1855.24	152.1	0.57	2*n*	Ma
1865.48	166.5	0.56	5*n*	En
1878.20	158.8	0.61	4*n*	β
1880.91	166.7	0.36	3*n*	Hl
1891.26	183.2	0.46	4*n*	Hl
1897.95	192.7	0.51	3*n*	Hu
1898.10	191.2	0.64	3*n*	A
1904.23	195.3	0.46	2*n*	Biesbroeck

From the measures to 1891, Gore (*A. N.* 3283) finds a period of 174.73 years.

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)... Se... Se^2... Se (*Comp. Rend.* **XLVIII**, 375)...Bru^2...OΣ (**IX**)...Gl...WS...WS^2...Cin^5...Cin^6... Δ (1474, 2193) ... Δ (**II**) ... En (1673) ... Flm ... Hd...Hl (*A. J.* 269)...Hl (*Wash. Obsns.* 1880, 1882)...Hl (**II**)...Sp (**II**) (**II**, App)...Sk...Sk^2...Big...T (3185)...β^1... β^3...β (*Ast. and A.-P.* **XI**, 662) (*Pop. Ast.* **V**, 450)...Big (*Bul. Ast.* **XII**, 299) .... Com (*Pub. Washburn Obsy.* **X**).... Gore (3283).... Hu (*A. J.* 427).... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 500; **LXII**, 383; **LXIV**, 795)...A (3584)...Doolittle (*Pub. Flower Obsy.* **I**)...Biesbroeck...]

(See p. 1071)

4571. **H 4078.** The only measures are: 15^{m} 30^{s}

1903.20	137°5	10″61	2*n*	β^6	8.5...9.2

4574. **H 90.** "R. A. perhaps 1^{m} more," The description is very much like that of H 779 (No. 4512). 15 39:

4576. **Σ 1217.** Relatively fixed, but the components have a large common proper motion: 15 56

Porter 0″183 in 199°9
Kustner 0.189 in 200.9

1867.45	241°6	29″75	3*n*	Δ
1891.21	241.4	29.49	2*n*	Eng
1898.13	241.3	29.28	3*n*	Doo

Ma (*F. S.* **II**)... Δ (**II**)...Engelhardt (**III**)...Doolittle (*Pub. Flower Obsy.* **I**)... Espin (*Mon. Not.* **LXIV**, 676)...]

4578. **Σ 1218.** No change. 16 22

1867.22	269°6	4″20	3*n*	Δ
1902.32	268.7	4.75	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)..H (**VII**) ... Δ (**II**) ...]

4580. **Σ 1219.** No change. 16 32

1867.57	80°7	11″44	4*n*	Δ
1893.18	80.6	11.57	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**)... Δ (**II**)... Glasenapp (**II**)... *A. G. Leipzig*, p. 248... *Annals Toulouse Obsy.* **III**...]

4581. **S 565.** (= σ 294 = **OΣ (App)** 93.) Change from proper motion. The positions of 1841 and 1903 give 0″096 in 43°7 for the proper motion of A. 16 35

1841.23	166°0	74″69	1*n*	OΣ	6.8...8.5
1868.30	168.0	75.87	1*n*	OΣ	
1876.12	168.3	76.54	3*n*	Δ	6.0...8.0
1878.28	168.3	76.30	1*n*	OΣ	
1879.83	168.1	76.66	3*n*	Doubiago	
1886.42	168.8	77.27	4*n*	Franz	
1903.11	169.7	78.03	3*n*	β	6.2...8.2

[Δ (I)...OΣ (X, p. 18)...Franz (3080)...β^6...]

$16^m 51^s$ **4582.** **Hu 116.** (AC = **H 784.**) For the distant star H gave, 5°: 15″: 10...11 (1820+). No other measures.

[Hu (*A. J.* 485)(*Bul.L. O.* No. 44)...]

17 46 **4587.** **Ho 353.** (= **Innes 393.**) No other measures.

[Ho (3233)...Innes (*Mon. Not.* **LXII**, 475)...]

17 52 **4588.** **OΣ 191** *rej.* (= **S 567**). Fixed.

1898.31 191°0 37″38 3*n* Hu

[Ma (**XI**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

17 53 **4589.** **Σ 1221.** No change.

1869.62	112°2	4″90	4*n*	Δ
1902.96	109.5	4.87	4*n*	β

There is a 13.5 m companion not previously seen:

1902.99 289°1 9″75 2*n* β

[Ma (*F. S.* **I**)... Ma (**XI**)...H (**V**)...Δ (**II**)...β^6...]

18 9 **4591.** **Σ 1220.** There may be a little change in the angle.

1868.38	209°8	29″51	4*n*	Δ
1880.64	211.1	29.63	2*n*	β
1903.00	211.2	29.57	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^3...β^6...]

18 31 **4593.** **β 1066.** Discovered with the 36-inch. The magnitude in DM is 7.6.

1898.96 185°5 2″28 1*n* β 7.0...13.0

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

18 31 **4594.** **Σ 1222.** No material change.

1866.78 48°7 9″86 3*n* Δ

[Ma (*F. S.* **I**)... Ma (**XI**)...Δ (**II**)...]

(See p. 1071)

19 10 **4597.** φ *Cancri.* **S 566.** (= **♅ VI. 109.**) The large star has a proper motion of 0″133 in 208°5 (Auwers). The only measure since South is:

1905.05 21°2 128″48 1*n* β^6

19 24 **4598.** **Schj. 9.** No other measures.

[*Schj.* (1485)...Δ (**I**)...]

(See p. 1071)

19 26 **4599.** **Hu 714.** With a later measure the mean is:

1903.78 327°1 0″39 2*n* Hu 8.6...9.2

[Hu (*Bul. L. O.* No. 65)...]

19 29 **4600.** *Cancri* 64. **♅ V. 109.** (= σ 299 = **H 785.**) Not in Heis as a naked-eye star; 7m in W^1. The magnitudes given are from H. The only other measures are:

1880.61	343°0	31″86	2*n*	β^3	5.9...10.0
1901.83	342.5	31.41	3*n*	β^5	6.0...10.5

4601. ϕ^2 *Cancri.* **Σ 1223.** (= **♅ II. 40** = **Sh 93.**) No material change, if any at all. The measures are far more numerous than the subject warrants, since the relative fixity of these stars was well known fifty years ago. The larger star is given a small proper motion, 0″014 in 236°3 (Auwers). $19^m 32^s$

1869.10	215°2	4″74	4*n*	Δ
1886.33	216.4	4.89	3*n*	Hl
1889.18	214.2	4.96	7*n*	Giacomelli
1898.26	214.7	4.95	4*n*	Hu
1903.08	216.0	5.02	2*n*	Do

[Ma (*F. S.* **I**)... Ma (**IX, XI, XIII, XV**) ... Bp ... Bes ... Da^3... Lu (1103)...Lu (**II, III**)...Wr (*Phil. Trans.* 1851)...Hl (*Wash. Obsns.* 1886)...Hl (**I, II**)... Wh...Ba (**II**)...Auwers (1393)...Wr...Wn (1738)...K...Se...Se^3...Δ (*Mem. Accad. Sci.*) ... Δ (1026, 1256)...Δ (**I, II**)... OΣ (**IX**) ... Ferr ... Du ... Pl ... Sk^3... Ra (**XXII, XXXVIII, XXXIX**) ... En (2663) ... K (409) ... Wn (**V**)... Je (2346, 2449)...Per...Per (2684)...Franz (2590)...Maw (**I**)...Lewis (*Mon. Not.* **LIV**, 315)...Giacomelli (**II**)...Glasenapp (**II, III**)...Cohn (3240)...Coleman (*Mem. R. A. S.* **LIII**)... Do (3680, 3930) ... *Annals Toulouse Obsy.* **III** ...HΣ (**XII**)...Thiele (3837)...]

4602. v^1 *Cancri.* **Σ 1224.** (= **♅ II. 41** = **Sh 92.**) There has been but little change since the measures of Σ. The angle seems to have advanced four or five degrees in something more than half a century, but the distance has remained practically constant. These stars probably form a physical system, since they have the same movement in space. The proper motions in *A. G. Berlin* are: 19 32

A = 0″108 in 222°0
B = 0.081 in 210.2

Some of the measures are:

1848.48	39°2	6″09	10*n*	OΣ
1867.87	41.3	5.84	4*n*	Δ
1882.32	43.1	5.93	6*n*	Hl
1889.19	41.9	5.82	6*n*	Giacomelli
1898.26	43.8	5.81	4*n*	Hu
1899.07	41.9	5.96	6*n*	Doo
1903.21	44.0	5.86	2*n*	Biesbroeck

[Ma (*F. S.* **II**)... Ma (**IX, X, XI, XIII, XV**)... Ma (324)... H^1...H^2... H (**VII**) ... Bes... Bp...Auwers (1393)... K (409)...Da^3... Se ... Se^3...Wr... K... Wh...Lu (1103)...Lu (**I, II, III**)...OΣ (**IX**)...Wn (**V**)...Ba (**II**)...En (1673, 2663)...Wn (1738)...WS...Gl...Du... Flm...Sp (**II**)... Franz (2590)...Per ....Per (2684)....Hl (*Wash. Obsns.* 1863, 1886)....Hl (**I, II**).... Ra (**XXII, XXXIX**)... Pl... Sk^2... Sk^5... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (2199, 3798, 3930)...Δ (1026, 1256)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)... Je (2346, 2449)...Maw (**I**)...Giacomelli (**II**)...Lewis (*Mon. Not.* **LIV**, 315)... Glasenapp (**II, III**).... Cohn (3240) .... HΣ (**XII**).... Collins (*A. J.* 378).... Knorre (3300)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...Biesbroeck...]

4603. **H 2446.** No recent observations. 19 35

1847.24 105°1 26″33 1*n* J^2

4605. **Schj. 10.** The only measure is the following: 19 38

1902.93 90°4 42″80 2*n* β 8.9...9.4

[Schj (1485)...β^6...]

4606. 30 *Monocerotis.* **♅ VI. 118.** Examined with the 40-inch in 1903. This star has no companion, distant or otherwise. There is very little doubt that Herschel's star is 2 *Hydrae*, which is 40^s *f* and 5′ *s.* (See No. 4612.) 19 40

$19^m\ 52^s$ **4607.** **Σ 1226.** Without change.

1867.89	145°2	2″42	3*n*	Δ
1905.11	144.1	2.37	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... Se² ... Se³ ... OΣ (**IX**) ... Δ (**II**) ... β⁶ ...]

19 54 **4608.** **S 568.** B is O. Arg. S. 8509. (= Lalande 16579 and 16588.) Without change.

1903.20	87°1	40″94	3*n*	β	6.4 ... 8.2

[Ra (**XXII**) ... β⁶ ...]

20 17 **4609.** *o Ursae Majoris.* **β 1067.** Discovered with the 36-inch. The large star has a proper motion of 0″176 in the direction of 229°8 (Auwers). There is no doubt of this being a physical system, as the small star is moving exactly with the other. If it was fixed in space, the position-angle would decrease 11° and the distance 1″27 in the interval between 1889 and 1899. It is evident from the measures that there has been no sensible change.

The following are all the later measures:

1895.09	194°4	7″15	2*n*	Barnard	
1899.17	192.3	7.15	1*n*	A	... 15.5

Engelhardt measures two distant stars in the field:

1888.30	152°5	143″70	2*n*
1894.27	152.1	144.05	2*n*
1888.30	208.0	177.23	2*n*
1894.27	208.0	175.95	2*n*

[β (**XV**) ... β (2929, 3141) ... (*Pub. L. O.* **II**) ... Barnard (*A. J.* 447) ... A (3638) ... Engelhardt (**II, III**) ..]

20 21 **4610.** **Σ 1227.** Unchanged.

1867.91	163°2	24″98	4*n*	Δ
1902.39	163.3	24.88	1*n*	Hu

[Ma (*F. S.* **II**) ... H (**V**) ... Δ (**II**) ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ...]

20 22 **4611.** **Σ 1228.** Unchanged.

1868.80	351°0	8″88	4*n*	Δ
1892.12	353.8	8.89	2*n*	Toulouse
1899.27	349.6	9.25	1*n*	Coleman

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... WS ... Gl ... Δ (**II**) ... Lewis (*Mon. Not.* **LIV** 315) ... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ...]

20 27 **4612.** 2 *Hydrae.* Measured in trying to identify H VI, 118 (30 *Monocerotis*). There is no doubt of 2 *Hydrae* being the star observed by Herschel. (See No. 4606.) There is a faint star, nearly following, about the same distance as that measured.

20 34 **4615.** **OΣ 193.** (= **H 447.**) Probably fixed.

1868.04	295°3	13″63	3*n*	Δ
1878.01	298.1	14.17	1*n*	β
1898.24	295.3	14.02	3*n*	Hu

[Ma (**XI, XIII**) ... Δ (**I**) ... β¹ ... OΣ (**IX**) (**X**, p. 193) ... Hu (*Pub. L. O.* **V**) ...]

4616. **Hu 715.** With a later measure the mean is: $20^m\ 37^s$

1903.78	185°3	2″61	2*n*	Hu	8.6 ... 12.2

[Hu (*Bul. L. O.* No. 65) ...]

4617. **Hn 96.** No other measures. 20 39

[*Pub. Washburn Obsy.* **II, VI**) ...]

4618. **H 2445.** The larger star has a proper motion of 0″041 in 0° (*A. G. Harvard*). 20 43

4620. **Σ 1225.** Without change. The proper motion is given 0″057 in 90° (*A. G. Harvard*). 20 55

1869.22	192°2	3″56	4*n*	Δ
1902.73	190.8	3.55	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Se ... Δ (**II**) ...]

4623. **Arg. 19.** "Duplex Cl. III" in O. Arg. S. Examined and estimated as given (1876). 21 36

4624. **Σ 1230.** Distance increasing, probably from proper motion. This is given from meridian positions, 0″035 in 55°1 (*A. G. Berlin*). 21 37

1864.62	192°5	29″28	4*n*	Δ
1878.22	192.7	29.90	1*n*	β
1898.14	190.2	30.90	3*n*	Doo

[Ma (*F. S.* **II**) ... Ma (**XIII**) ... Δ (1474) ... Δ (**II**) ... Gl ... WS ... Flm ... Big ... HΣ (**XII**) ... β¹ ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

4631. **H 2450.** "Pos. estimated from diagram." Bigourdan gives 310° for the angle. This is probably the 9.4 m star, DM (14°) 1901. 22 22

4632. **Σ 1231.** (= **H 449.**) No change. 22 23

1867.47	210°7	24″93	3*n*	Δ

[Ma (*F. S.* **II**) ... Δ (**II**) ...]

4633. **H 787.** H (V) 292°1 : 258°6 : 20″± : 5″± (1830+). 22 23

4634. **A 551.** (AC = **Σ 1233.**) The principal star of Σ 1233 was discovered to be a close pair by Aitken. No other measures. No change in the Struve companion. 22 26

1868.58	329°8	17″72	4*n*	Δ
1879.62	330.6	18.08	4*n*	β
1903.03	328.8	18.16	2*n*	A

[Ma (*F. S.* **II**) ... H (**VII**) ... Δ (**II**) ... β¹ ... β³ ... A (*Pub. A. S. P.* **XV**, 22) (*Bul. L. O.* No. 50) ...]

4635. **A. G. 152.** Noted as double in *A. G. Berlin*, but found to be single by Miller (*A. J.* 546). 22 31

$22^{m}\ 37^{s}$ **4636.** **Weisse 19.** Description from W². Examined in 1902, but not double, and no pair found near.

22 50 **4638.** **OΣ 192** *rej.* Rejected as single in the *Poulkowa Catalogue* of 1850. In Heis 6–7m. Probably unchanged.

1878.35	237°7	1″60	1*n*	OΣ
1886.35	229.6	1.95	2*n*	HΣ
1898.63	234.2	1.67	3*n*	Hu

[Ma (**XI**) . . . . OΣ (**X**, p. 193) . . . . Δ (**I**) . . . . Hu (*Pub. L. O.* **V**) . . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . HΣ (**XII**) . . .]

23 15 **4639.** **Arg. 20.** "Duplex, Cl. III" in *Arg.*

1877.79	172°8	15″29	3*n*	Cin	8.0 . . . 8.5

[Cin⁴ . . . Cin⁵ . . .]

23 31 **4641.** **Hu 627.** No other measures.

[Hu (*Bul. L. O.* No. 57) . . .]

23 36 **4643.** **Σ 1237.** Companion invisible to Δ, 1866. In 1875 I found it readily with the 6-inch; appeared larger than 11.8. Declination in *Mens. Micr.* about 3′ too large. Probably fixed.

1869.74	175°0	5″45	2*n*	OΣ
1905.14	172.6	5.46	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XIII**) . . . ⅃ (1736) . . . OΣ (**IX**) . . . β⁶ . . .]

23 51 **4645.** **Σ 1234.** If Struve's measure is correct, the distance has increased.

1869.04	69°7	21″69	4*n*	Δ
1898.21	68.5	22.36	3*n*	Doo

[Ma (*F. S.* **II**) . . . H¹ . . . H² . . . Flm. . . ⅃ (1735) . . . Δ (**II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Glasenapp (**V**) . . .]

(See p. 1071)

23 56 **4647.** **Hu 716.** The mean of all the measures, including that in Part I, is:

1904.12	104°5	0″44	3*n*	Hu	7.0 . . . 9.0

[Hu (*Bul. L. O.* No. 65) . . .]

23 57 **4648.** **Σ 1236.** The distance seems to be increasing. This of course would be due to proper motion.

1843.18	116°3	36″05	1*n*	Ma
1867.47	115.4	36.35	3*n*	Δ
1898.25	113.7	36.85	3*n*	Doo

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Flm. . . Δ (1735) . . . Δ (**II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

24 23 **4651.** **Σ 1238.** No material change.

1867.59	319°3	29″21	3*n*	Δ

[Ma (*F. S.* **II**) . . . Δ (**II**) . . .]

(See p. 1071)

24 24 **4652.** **Σ 1232.** Without change.

1867.08	350°2	31″01	3*n*	Δ

[Ma (*F. S.* **I**) . . . . Ma (**XI**) . . . . Ra (**XXVII**) . . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Δ (**II**) . . .]

(See p. 1071)

4654. **Σ 1239.** Without change. $24^{m}\ 42^{s}$

1867.95	288°3	12″38	3*n*	Δ

[Ma (*F. S.* **I**) . . . Δ (**II**) . . .]

(See p. 1071)

4655. *θ Cancri.* **H 2452.** (= H̥ V. 59 = σ 301.) The 24 45
change is due to proper motion of A. This is given:

Auwers	0″088 in 235°4
Newcomb	0.088 in 219.3

The measures of Knott, Doolittle, and Burnham give for this motion:

0″119 in 257°4

If the meridian values are substantially correct, the small star has a motion of its own.

The following are all the measures:

1783.05	*nf*	44″87	1*n*	H̥
1862.31	59°3	58.41	1*n*	Kn
1880.14	60.0	60.84	3*n*	β
1898.15	60.4	62.55	2*n*	Doo
1902.99	60.8	63.14	4*n*	β

[Kn . . . β³ . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . . β (*Pop. Ast.* **XI**, 577) . . . . Innes (*Mon. Not.* **LXI**, 416) . . . β⁶ . . .]

4656. **Σ 1235.** Apparently without change, but later measures are needed. 24 47

1869.54	79°9	1″17	4*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . .]

4657. **Hu 717.** With two later measures the mean is: 25 4

1904.12	58°3	0″35	3*n*	Hu	8.8 . . . 9.0

[Hu (*Bul. L. O.* No. 65) . . .]

4658. **S 569.** The companion is Cord. DM (25°) 6173. 25 13
The only measures since South are my own:

1903.22	338°9	29″80	2*n*	β⁶	8.1 . . . 9.2

The distance is 10″ less than that of South. In each of the measures, the pair is called "excessively difficult." It seems very improbable that any such error should be made in the measure, or that there should be any such change in the relation of the stars. If due to a misprint, the error is repeated several times.

4660. **Σ 1240.** (= **H 451.**) "Points back to a third star," 25 37
H. The change is evidently from proper motion.

1868.03	72°9	23″42	4*n*	Δ
1891.33	74.4	24.23	2*n*	HΣ
1898.30	74.4	24.62	7*n*	Doo

The only measures of the distant star mentioned by Herschel are:

1898.30	245°9	50″92	7*n*	Doo	. . . 10.0

[Ma (*F. S.* **II**) . . . H (**VII**) . . . Flm. . . Δ (1735) . . . Δ (**II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . HΣ (**XII**) . . .]

26^m 7^s **4662.** **Σ 3119.** This is the same as Σ 3066 *rej.*, described as Cl. IV, 8...11. Slow rectilinear motion. The measures of Σ, Δ and β give for the proper motion of A, 0″.030 in 240°.0.

1830.20	213°.6	24″.82	4*n*	Σ
1867.39	214.1	25.99	4*n*	Δ
1878.22	215.9	26.21	1*n*	β
1903.04	215.7	26.81	3*n*	β

[Ma (*F. S.* **II**)...Δ (1574)...Δ (**II**)...Flm...β^1...β^6...]

26 15 **4663.** **Σ 1241** *rej.* Magnitudes not given in *Catalogus Novus.* Examined in 1904; principal star 7.5 m with two distant stars in the field, one *sp*, and the other a little nearer *sf*, 98°.6 : 134″.0.

27 36 **4665.** **Σ 1242.** Without change.

1867.86	168°.5	2″.52	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**IV**)...Se...Δ (**II**)...]

27 41 **4666.** **Σ 1243.** Motion uncertain.

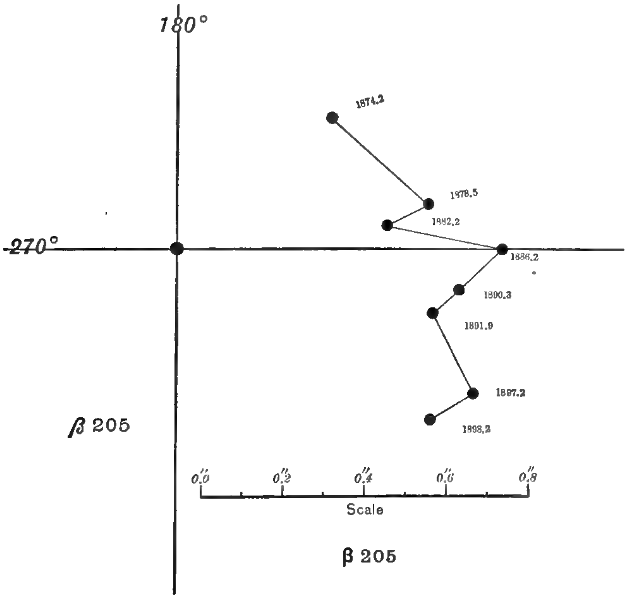
1867.19	225°.3	1″.84	3*n*	Δ
1881.34	228.5	1.76	1*n*	Pt
1893.24	225.5	1.53	2*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Se^2...Se^3...Flm...Δ (**II**)..Pt...Lewis (*Mon. Not.* **LIV**, 315)...]

27 48 **4667.** **H 97.** In H (V), 279°.1 : 8″ ± (1828+) 10...10–11. The only recent position is:

1905.11	279°.9	11″.35	3*n*	Miller	10.0...10.2

27 54 **4668.** **β 205.** Discovered with the 6-inch. The change in angle is a little more than 2° per year, with perhaps a small increase in the distance, but the measures are not very accordant. The Cordoba magnitude is 6.4. Lacaille 3377. See measures a 14.5 m star, 354°.5 : 26″.44 (1898.16) 1*n*.



β 205

1877.82	280°.6	0″.81	2*n*	Cin
1882.21	276.6	0.52	3*n*	Sp
1886.17	270.1	0.80	2*n*	W
1889.16	257.0	0.74	1*n*	Lv
1890.28	261.9	0.70	2*n*	β
1891.87	256.2	0.65	3*n*	β
1897.23	244.4	0.81	3*n*	A
1898.16	242.5	0.75	1*n*	See
1898.25	236.5	0.75	3*n*	A
1900.21	239.8	0.66	3*n*	A
1903.04	230.5	0.70	6*n*	Doo

In the diagram, reproduced from *Pub. Yerkes Observatory* I, all the positions are given in the opposite quadrants (−180°).

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β (3048, 3114)...β (*Pub. L. O.* **II**)...Cin^4...Cin^5...Wilson (Cin^{10})...Sp (**II**)...Lv^1...Sellors (3240)...A (3465, 3584) (*Bul. L. O.* No. 11)...Doolittle (*A. J.* 547)...]

(See p. 1071)

4669. **A. G. 153.** Double in *A. G. Lund.* Measures by β^6. 27^m 57^s

4673. **H 2454.** "A larger *p*." This is probably the 8.5 m star SD (6°) 2642, and the double SD (6°) 2643, which is 9.7 m, 5^s *f* and 2′.3 *s*. 28 34

4675. **Σ 1246.** (= **H 5474.**) Fixed. 29 23

1868.08	114°.4	10″.21	4*n*	Δ
1893.24	116.5	10.62	1*n*	Leip

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...*A. G. Leipzig*, p. 208)...]

4677. **Σ 1245.** (= **H III. 49 = Sh 94.**) Relatively fixed, but common proper motion. This movement from meridian positions is given by Bossert: 29 29

A = 0″.183 in 209°.2
B = 0.166 in 212.5

Evidently the motion is the same for both components.

1867.07	26°.6	10″.50	4*n*	Δ
1889.25	26.7	10.43	3*n*	T
1896.21	24.8	10.26	2*n*	Coleman

Glasenapp measures three distant stars:

AC	1893.12	121°.1	92″.23	2*n*	...10.7
AD	1893.12	280.5	120.19	2*n*	...12.0
AE	1893.12	211.4	131″.88	2*n*	... 8.7

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (**VII**)...P^1...Ra (**XXII, XXXIX**)...Wr...Se...Se^3...Δ (*Mem. Accad. Sci.*)...Δ (1026, 1256)...Δ (**I, II**)...Hl (**I**, p. 131)....T (3185)....Glasenapp (**II**)....Coleman (*Mem. R. A. S.* **LIII**)....*Annals Toulouse Obsy.* **III**...]

4678. **OΣ (App) 94.** B is W^1 VIII^h. 724. The only other measures are: 29 31

1903.11	133°.2	43″.49	3*n*	β

There are three faint stars near B.

[Δ (**I**)...β^6...]

4679. **Σ 1244.** No evidence of change. 29 38

1867.50	1°.5	3″.65	3*n*	Δ
1893.18	0.6	3.74	2*n*	Jones

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Jones (*A. J.* 312)...]

$29^m\ 43^s$ **4680.** **Σ 1247** *rej.* "Triplex" in *Catalogus Novus.* Measures by β^6.

29 53 **4682.** **A. G. 154.** Double in *A. G. Berlin.* Measures by Kustner.

[Kustner (3821)...Miller (*A. J.* 546)...]

30 17 **4684.** **β 206.** Discovered with the 6-inch. Unchanged.

1877.11	281°.7	1″.99	2*n*	Cin
1880.27	279.5	1.62	1*n*	Pt
1886.21	285.2	....	1*n*	LM
1889.09	280.3	1.76	3*n*	Lv
1898.19	280.2	1.93	1*n*	See

[β (IV)...β (*Mon. Not.* **XXXIV**, 382)...Cin⁴...LM...Lv¹...Pt...See (   )...]

30 43 **4688.** **Σ 1249** *rej.* Not in DM, but in the field with, and *n* of the 8.2 m star, DM (20°) 2132.

1905.14	40°.0	25″.03	1*n*	β^6	9.5...9.5

30 56 **4690.** **Hn 97.** No other measures.

[*Pub. Washburn Obsy.* **II**, **VI**...]

31 0 **4692.** **H 453.** "The small star the *minimum visibile* Verified with a high power." The only measure is:

1903.96	101°.5	19″.04	1*n*	β^6	8.7...14

31 27 **4693.** **Σ 1250.** Probably fixed.

1866.97	167°.4	21″.31	3*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

31 50 **4696.** **Σ 1251.** No change.

1868.21	30°.5	6″.32	3*n*	Δ
1904.44	29.5	5.95	3*n*	Duncan

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

31 56 **4697.** **Σ 1248.** No change.

1867.08	209°.0	18″.30	3*n*	Δ
1905.33	210.4	18.20	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

31 59 **4699.** **H 99.** B is L 17005 $4^s.8$ *p* and 54″ *s.* In measuring with the 18½-inch a faint companion to B was added:

AB	1880.12	211°.0	64″.62	2*n*	β	6.5... 7.7
	1903.12	205.8	62.46	2*n*	β	7.0... 7.7
BC	1880.12	209.6	9.16	2*n*	β	...12.0
	1903.12	211.1	9.77	2*n*	β	...12.2

The change in AB is due to the proper motion of A, 0″.279 in 286°.0 (Porter). The meridian positions give for AB:

1797	231°.7	76″.0	Lalande
1825	236.1	78.6	Weisse

[β^3...β^6...Porter (3452)...]

4700. **Innes 68.** Discovered by Innes at the Cape of Good Hope. $32^m\ 1^s$

1898.3	68°.2	8″.15	1*n*	See

[Innes (3406) (*Mon. Not.* **LXIV**, 132)...]

4701. **S 570.** The proper motion in *A. G. Berlin* is 0″.008 in 276°.7. 32 13

[Ra (**XXI, XXIII**)...] (See p. 1071)

4702. **Σ 1252** *rej.* This is the only pair I could find for Σ 1252 *rej.* The R. A. is the same as that in *Catalogus Novus*, but the Decl. is 20′ less. There is no doubt of the identity of the two. 32 24

4705. **β 584.** The close attendant to this wide triple in *Praesepe* was discovered with the 18½-inch. The bright stars make S 571 = OΣ (App) 95. Each of the three bright stars has a slightly different proper motion, according to Rechenberg (*A. N.* 3482). He gives the movement of A as 0″.114 in the direction of 262°.4. In *A. G. Berlin*, 0″.058 in 285°.8. It is evident, if this star has any such annual change, that B is moving with it, as otherwise the change in A from 1878 to 1892 would amount to 1″.6. 33 3

A and B

1892.05	292°.4	1″.26	3*n*	β	

A and C (= S 571)

1875.07	156°.3	45″.12	3*n*	Δ	7.0...7.3
1876.49	156.3	44.70	3*n*	Schur	
1892.05	156.2	44.80	3*n*	β	
1899.07	156.7	45.04	2*n*	β	

A and D

1875.07	241°.2	92″.76	3*n*	Δ	...6.3
1876.04	241.4	92.26	2*n*	Schur	
1899.07	241.6	92.85	2*n*	β	

D and C

1875.07	87°.9	99″.72	3*n*	Δ
1876.05	87.8	99.69	3*n*	Schur
1889.33	88.0	99.89	2*n*	Franz

[β (**X**)...β¹...β (3114) (*Pub. L. O.* **II**)...Δ (**I**, p. 252)...Ra (**XXIII**)...Schur (2255)...Franz (3464)...]

(See p. 1071)

4708. **β 207.** Discovered with the 6-inch. Without change. The larger star is red. The later measures are: 33 16

1877.10	106°.1	4″.54	2*n*	Cin
1880.71	102.2	4.18	2*n*	β
1888.65	102.8	4.06	2*n*	Lv
1893.20	101.6	4.34	2*n*	Jones
1898.21	101.6	4.47	1*n*	See

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β^3...Δ (**I**)...Cin⁴...Lv¹...Jones (*A. J.* 312)...See (   )...]

$33^m\ 20^s$ **4709.** Σ 1255. (= H IV. 54 = **H** 100 = **S** 575.) H says, "Quadruple; C and D are each 20m, and form with A and B a segment of a circle."

The components have a large proper motion:

A =	0″.329 in 155°.1	Stumpe
	0.355 in 159.1	Glasgow
B =	0.336 in 149.0	Stumpe
	0.341 in 160.8	Glasgow

As there is no relative change, the movement is the same for both stars.

1868.14	30°.9	26″.53	4*n*	Δ
1889.19	30.6	26.38	5*n*	Giacomelli
1904.24	30.9	26.25	2*n*	β

The only measures of the small stars are:

BC	1904.26	32°.4	39″.94	1*n*	β	...13
BD	1904.26	54.4	56.43	1*n*	β	...12.5

Ma (*F. S.* **I**) ... En ... Ra (**XXIV**) ... Δ (1204) ... Δ (**I, II**) ... Giacomelli (**II**) ... Grant (*Mon. Not.* **XLIII**, 127) ... Engelhardt (**III**) ... *Annals Toulouse Obsy.* **III** ... β^6 ...]

33 29 **4710.** Σ 1254. (= **S** 573.) No change in AB. C and D are not in Σ. The large star has a proper motion of 0″.056 in 270° (*A. G. Berlin*).

1866.66	54°.9	20″.10	3*n*	Δ
1893.14	52.8	20.29	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**II**) ... Kn ... Lassell (*Mon. Not.* **XIII**, 183) ... Δ (**II**) ... Glasenapp (**II**) ...]

33 34 **4711.** ε *Cancri.* **S** 574. B is P VIII. 128. In Auwers the principal star is called 41 *Cancri.* The proper motion is given:

A. G. Berlin	0″.069 in 276°.6
Auwers	0.084 in 270.7

1875.66	249°.2	134″.20	2*n*	Δ	5.7...7.0

[Δ (I, p. 374) ...]

(See p. 1071)

33 50 **4713.** **S** 572. Nothing since but the following:

1902.90	90°.0	75″.61	2*n*	β^6	8.0...9.0

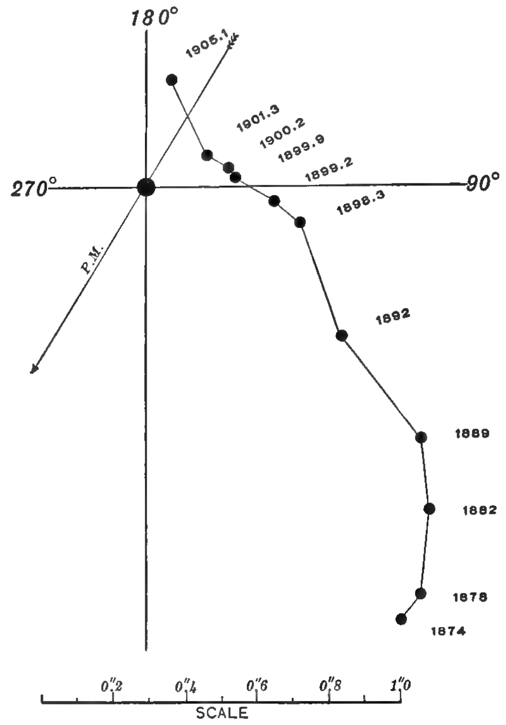
There is a 7.6m star nearer A.

1902.90	162°.2	63″.15	2*n*	β^6

33 53 **4714.** **β** 208. Discovered with 6-inch. It appears to be a most interesting system from the relative change and from the large proper motion. Porter gives this movement in space as 0″.483 in the direction of 328°.3. The motion in angle is now very rapid.

The following are all the measures:

1874.19	30°.4	1″.4±	1*n*	β
1877.13	31.7	1.71	1*n*	Cin
1878.43	33.9	1.37	5*n*	Cin
1882.21	40.9	1.21	3*n*	Sp
1886.18	43.2	1.27	1*n*	W
1889.15	47.5	1.06	2*n*	β
1892.11	52.3	0.70	3*n*	β
1894.26	47.6	0.57	1*n*	Com
1895.32	55°.5	0″.6±	1*n*	Com
1897.83	74.7	0.39	1*n*	See
1898.29	76.2	0.45	2*n*	A
1899.19	83.2	0.36	1*n*	A
1899.91	94.4	0.26	2*n*	A
1900.20	102.9	0.24	4*n*	A
1901.26	116.8	0.20	3*n*	A
1905.18	167.5	0.30	2*n*	A



β 208

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... β (2930, 3141) (*Pub. L. O.* **II**) (*Ast. and A.-P.* **XI**, 464) ... Sp (**II**) ... Cin^4 ... Cin^5 ... Wilson (Cin^{10}) ... Com (*Pub. Washburn Obsy.* **X**) ... See ( ) ... A (3584, 3638) (*Bul. L. O.* No. 11) ...]

(See p. 1071)

4715. *Cancri* 109. **β** 585. Discovered with the 18½-inch. One of the outlying stars of *Praesepe*. B. A. C. 2927. Magnitude in DM 7.0. Motion doubtful. The following are all the later measures: $34^m\ 20^s$

1886.25	109°.4	0″.56	2*n*	HΣ
1889.72	110.3	0.46	6*n*	Sp
1893.72	110.3	0.43	2*n*	Sp
1899.99	115.0	0.58	2*n*	Doo
1901.25	111.4	0.41	1*n*	Bowyer
1901.31	116.7	0.37	2*n*	Bryant
1903.17	106.4	0.59	1*n*	Bowyer
1903.21	108.4	0.49	1*n*	Lewis

[β (**X**) ... β^1 ... Sp (**III**) ... HΣ (**XII**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIV**, 784) ...]

4716. See 101. The only other measures are: 34 21

1899.07	87°.1	7″.40	2*n*	Boothroyd

[See (*A. J.* 431) ... Boothroyd (*A. J.* 505) ...]

34^m 29^s **4718.** **Σ 1256.** Probably fixed.

1867.09	213°.5	26″.19	3*n*	Δ
1902.73	214.4	26.69	1*n*	Hu

[Ma (*F. S.* **II**) . . . Δ (**II**) . . .]

34 43 **4719.** *f Mali.* **H 4120.** The principal star is B. A. C. 2932, and the companion Cord. DM (29°) 6545 (9.8).

1905.13	60°.7	52″.35	3*n*	Miller

34 54 **4721.** **Σ 1262.** Unchanged.

1866.75	200°.8	6″.69	3*n*	Δ

[Ma (*F. S.* I) . . . Ma (**XI**) . . En (1673) . . . OΣ (**IX**) . . . Se . . . Se^2 . . . Δ (**II**) . . .]
(See p. 1071)

34 56 **4723.** **Σ 1258.** Probably unchanged.

1867.06	331°.0	9″.49	3*n*	Δ
1898.33	330.4	9.86	1*n*	Gla
1902.73	330.8	10.14	1*n*	Hu

[Ma (*F. S.* I) . . . Ma (XI) . . . Se . . . Da^2 . . . Ra (**XXII, XXVII**) . . . Bl (**V**) . . . Δ (1209) . . . Δ (**I, II**) . . . Glasenapp (**V**) . . . Do (3799) . . .]

34 59 **4724.** **Σ 1260.** (= **S** 577.) Unchanged.

1868.47	301°.4	4″.94	4*n*	Δ
1903.22	301.7	5.26	5*n*	Jouffray

[Ma (*F. S.* I) . . . Se . . . Se^3 . . . Cin^5 . . . Cin^6 . . . Wilson (Cin^{10}) . . . Δ (**II**) . . . *Annals Toulouse Obsy.* **III** . . . Do (3799) . . . Jouffray (*Bul. Ast.* **XXI**, 299) . . .]

34 59: **4725.** **H 102.** "In field with H 103," H (VII) 320° ± : 5″ ± : 10 . . . 12. Looked for once, but not identified.

35 1 **4727.** **Σ 1261.** (= **S** 578.) Fixed.

1867.55	302°.3	29″.61	3*n*	Δ

[Ma (*F. S.* **II**) . . . Ma (XI) . . . Δ (**II**) . . .]

35 17: **4729.** **H 103.** H (VII) 135° ± : 7″ ± : 10 . . . 12.

35 24 **4730.** **β 209.** Discovered with the 6-inch. So far there is no evidence of change.

1878.75	357°.0	1″.57	4*n*	Sp
1881.28	357.7	1.43	1*n*	Pt
1900.32	358.3	1.39	2*n*	Bryant
1901.23	357.8	1.72	1*n*	Bowyer
1903.35	356.9	1.50	2*n*	Biesbroeck

[β (**IV**) . . . β (*Mon. Not.* **XXXIV**, 382) . . . Δ (**I**) . . Sp (**II**) . . . Pt . . . Bryant and Bowyer (*Mon. Not.* **LXI**, 486; **LXII**, 383) . . . Biesbroeck . . .]

4731. **Ho 354.** No motion. 35^m 34^s

1899.29	177°.0	0″.99	3*n*	A	8.4 . . . 9.7

[Ho (3233) . . . A (3638) . . .]

4733. **Σ 1257** *rej.* From *Catalogus Novus.* In DM 8.5 m. 35 58

1905.33	124°.3	26″.05	1*n*	β^6	8.0 . . . 10.5

4734. 9 *Hydrae.* **H 4124.** The large star has a proper motion of 0″.13 in 180°.0 (Bossert). The only measures are: 36 9

1903.18	115°.1	32″.39	3*n*	β^6	. . 11.8

4735. **Σ 1264.** Fixed. 36 24

1868.49	269°.8	5″.98	4*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (**XIII**) . . . H (**V, VII**) . . . Se . . . WS . . . Gl . . . Δ (**II**) . . .]

4736. **Σ 1253.** Fixed. 36 28

1868.63	244°.4	25″.91	4*n*	Δ

[Ma (*F. S.* I) . . . Δ (**II**) . . .]

4737. *Monocerotis* **201.** **Ħ VI. 107.** The principal star is SD (7°) 2587, and the companion is SD (8°) 2463. No observation since 1782 except the following: 36 35

1905.14	151°.6	91″.27	1*n*	β^6	7.5 . . . 9.7

4739. **Ho 355.** Probably no change. 36 54

1899.33	182°.1	0″.54	3*n*	A	8.2 . . . 8.2

[Ho (3233) . . . A (3638) . . .]

4741. **Σ 1266.** (= **Ħ IV. 118** = **H 456.**) The place in Ħ is in error $+5^m$ R. A., and +10′ Decl. (see No. 4792). These stars are relatively fixed. 37 12

1866.90	63°.8	23″.29	3*n*	Δ

[Ma (*F. S.* **I**) . . . Ma (XI) . . . Δ (**II**) . . .]

4742. **Σ 1265.** Fixed. 37 14

1868.36	311°.8	5″.69	4*n*	Δ
1893.23	312.3	5.76	1*n*	Leip

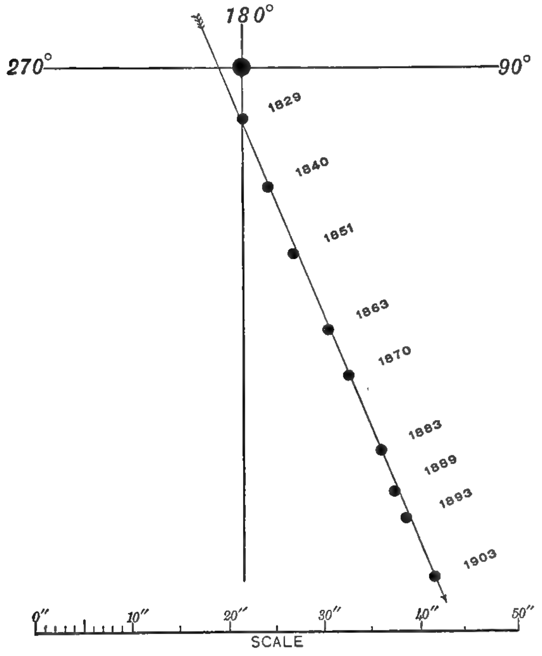
[Ma (**XI**) . . . Δ (**II**) . . . Ma (*F. S.* I) . . . *A. G. Leipzig*, p. 208 . . .]

4743. **Σ 1263.** This is a perspective pair, and interesting only from the considerable proper motion of the principal star. This is given from meridian observations: 37 17

Stumpe	0″.675 in 208°.7
Porter	0.659 in 206.2

The relative change will be seen from the following:

1829.46	4°.1	5″.43	2*n*	Σ
1840.28	12.3	13.05	4*n*	OΣ
1851.05	15.7	20.56	4*n*	OΣ
1863.38	18.2	29.10	3*n*	Δ
1870.63	19.0	34.35	3*n*	OΣ
1883.62	19.8	42.79	7*n*	En
1889.33	19.7	47.33	2*n*	Maw
1893.21	19.8	50.33	2*n*	Jones
1903.12	20.5	56.78	4*n*	β



Σ 1263

These positions give as the most probable value of the proper motion of A, 0″.701 in 202°.5.

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI**) ... Bp ... H1 ... H2 ... Σ1 ... Miller (806) ... OΣ (**IX**) ... Se .. Se3 ... Ba (**II, III, IV**) ... Wr ... Fedorenko (*St. Pet. Bul.* 1850) ... Ra (**XXIV**) ... Da3 ... Fl ... WS ... WS2 ... Gl ... En ... En (1673, 2663) ... Sp (2133) ... Sp (**II**) ... Du ... K (1519) ... Flm ... Flm (*Études et Lectures sur L'Astronomie* Vol. **VI**) .... Miller (*Mon Not.* **XII**, 170) .... Do (2197, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Δ (1110, 1126, 1256, 1474) ... Δ (*Mem. Accad. Sci.*) ... Δ (**I, II**) ... Je (2346) ... Pl ... Sk ... Nobile (2391) (*Rend. della R. Accad. Sci. Jan.* Nov. 1875; Feb. 1876; Dec. 1877) .... Seagrave (*Sid. Mess.* **II**, 22) .... Hl (**I, II**) .... Maw (**I**) .... Engelhardt (**III**) .... Sk5 .... Lewis (*Mon. Not.* **LIV**, 315; **LVI**, 359) (*Observatory*, **XXII**, 123) .... Espin (*Mon. Not.* **LXIV**, 676) ... β6 ...]

37^m 29^s **4744.** Kr 30. Noted as double in *A. G. Hels.* Later measures are:

1898.35	113°.7	1″.78	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

37 46 **4746.** 31 *Monocerotis.* **S** 579. (= **H** VI. 82.) *Fine yellow: beautiful blue,* Webb. B is SD (6°) 2707. The large star has a proper motion of 0″.039 in 319°.9 (Auwers). These are all the measures:

1880.52	308°.8	78″.35	3*n*	β3	
1903.85	309.1	78.45	3*n*	β6	...8.3

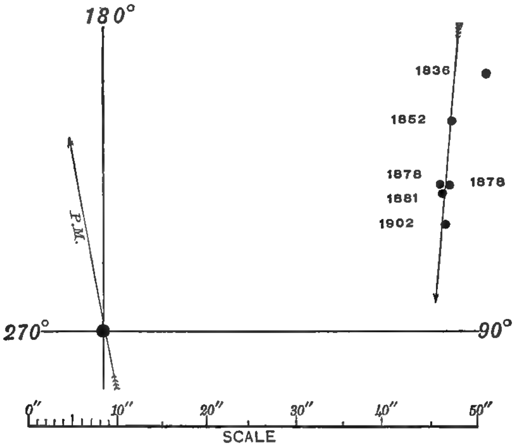
There is a small star nearer A:

1903.86	339°.6	57″.12	1*n*	β6	...14

4747. δ *Cancri.* **H** 457. The estimated angle of H is erroneous. The change is due to the proper motion of A. The following are all the measures: 37^m 54^s

1836.10	123°.8	(27″.94)	1*n*	Lamont
1852.30	121.1	45.82	1*n*	Lassell
1878.22	113.1	42.35	1*n*	OΣ
1878.68	113.5	41.49	2*n*	β
1881.26	112.1	41.26	1*n*	OΣ
1902.50	107.4	40.17	3*n*	β

The distance measure by Lamont is the difference of declination.



δ Cancri. H 457

The values of the proper motion of δ *Cancri* from meridian observations, and from the measures of the small star, 1852 to 1902, are as follows:

Auwers	0″.223 in 187°.3
Bossert	0.234 in 190.5
Measures of B	0.236 in 175.4

[Lassell (858) (*Mon. Not.* **XIII**, 183) ... Mu ... Sadler (*Mon. Not.* **XXXIX**, 188) ... Pk ... Flm ... OΣ (**X**, p. 78) ... β1 ... β3 ... β (*Observatory* **II**, 60) (*Mon. Not.* **XXXIV**, 374) ... β6 ...]

4753. Σ 1259. Error of 3½^m R. A., and 12′ Decl. in *Cat. Nov.* and *Pos. Med.* *Mens. Micr.* gives a different place, which is also wrong. The stars are relatively fixed. 38 51

1867.51	340°.5	4″.93	3*n*	Δ

[Ma (*F. S.* **I**) .... Ma (**XI**) .... Arg (1480) .... Δ (1475) .... Δ (**II**) .... β (*Mon. Not.* **XXXIV**, 373) ...]

38^m 54^s **4754.** **Σ 1267** *rej.* Measures from H (V). Since Part I was in type, I have identified and measured this pair. The star in the place given in Part I has only a distant companion, 135°9 : 65″0. The pair measured by Herschel, which is probably Σ 1267 *rej.*, is $1^m 18^s$ *f*, and 5′ 27″ *n*. The place is:

$$\left.\begin{array}{l}\text{R. A.} = 8^h\,40^m\,12^s\\ \text{Decl.} = 4^\circ\,45'\,14''\end{array}\right\}$$

This is 8.5 m in DM.

1905.16	62°5	7″27	2*n*	β^6	8.7...12.0

39 2 **4757.** **Kr 31.** Noted as double in *A. G. Hels.*

1898.36	276°4	6″91	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

39 3 **4758.** **Ho 251.** No other measures.

[Ho (2977) ...]

39 17 **4760.** **Σ 1270.** (= **S 580.**) Fixed.

1867.23	259°6	4″52	3*n*	Δ
1903.14	260.8	4.81	5*n*	Jouffray

[Ma (*F. S.* I) ... Se ... Wr ... Ra (**XXIII**) ... Hl ... Δ (1204) ... Δ (I, II) ... Cin 5 ... T (2898) ... Coleman (*Mem. R. A. S.* **LIII**) ... *Annals Toulouse Obsy.* **III** ... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

39 21 **4761.** **Σ 1269.** Fixed. Dembowski reverses the angle.

1868.49	308°6	11″28	3*n*	Δ	9.8...10.3

[Ma (*F. S.* I) ... Ma (**XI**) ... Δ (**II**) ... *Annals Toulouse Obsy.* **III** ...]

39 23 **4762.** **See 106.** The later measures are:

AB	1900.01	224°5	16″58	2*n*	Cg	6.5...12.0
BC	1900.01	329.7	2.61	3*n*	Cg	...12.7

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

39 26 **4763.** *ι Cancri.* **Σ 1268.** (= **H IV. 52** = **Sh 95.**) Without change. The large star has a proper motion of 0″046 in 220°3 (Auwers).

1866.75	307°1	30″38	3*n*	Δ
1889.21	307.4	30.42	6*n*	Giacomelli
1899.27	307.3	30.59	2*n*	Coleman

[Ma (*F. S.* I) ... Ma (**X, XI, XIII**) ... P 1 ... Se 1 ... Se 3 ... Ma (324) ... Ra (**XXIII**) ... Du .... H (**VII**) .... Δ (1204) .... Δ (I, II) .... Pk .... Per .... Per (2684) .... Giacomelli (**II**) ... Je (2346) ... Glasenapp (**II, III**) ... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ...]

39 53 **4767.** **H 458.** "A third forms an isos. triangle." The magnitude in DM is 8.5.

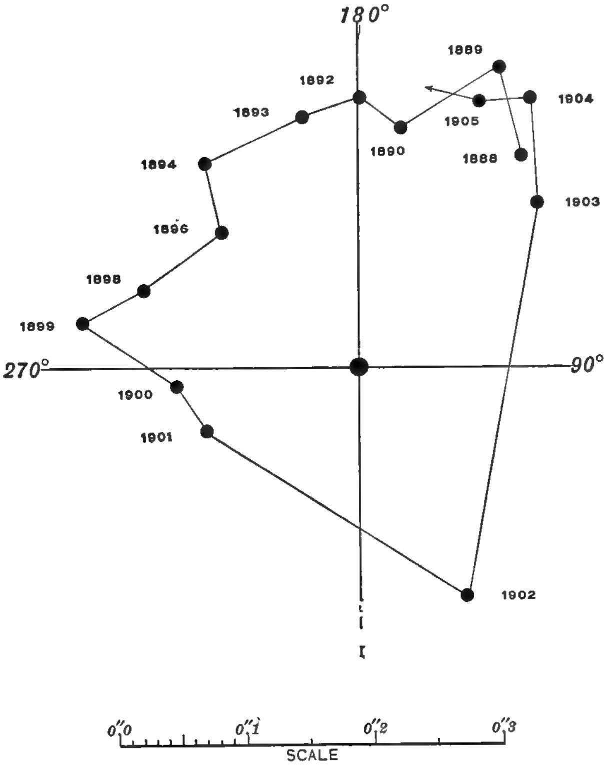
40 2 **4769.** **H 796.** The only measure is the following:

1882.11	133°1	13″02	1*n*	W	8...10

[Wilson (Cin 10) ...]

4771. *ε Hydrae.* **Schiaparelli.** (AC = Σ 1273.) The close pair, AB, was discovered by Schiaparelli in 1888, but OΣ in 1860 suspected an elongation of the large star in nearly a vertical direction, and in 1864 noted the same appearance in about 190°. The faint star, D, was added by Holden with the Washington 26-inch. 40^m 25^s

The large star was found to be a spectroscopic binary by Campbell (*Astrophysical Journal*, XIV, 139).



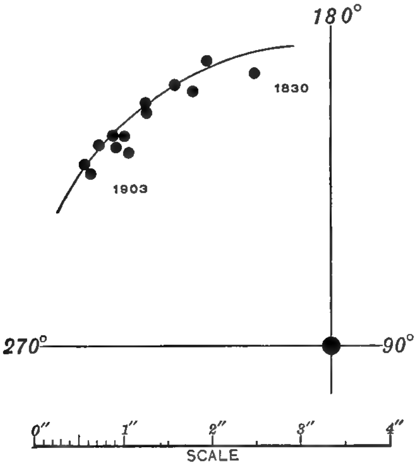
ε Hydrae. A and B

The following are all the measures of the close pair:

1888.28	142°0	0″21	2*n*	Sp
1888.98	154.4	0.26	2*n*	β
1889.25	151.7	....	2*n*	T
1889.31	149.6	0.4 ±	4*n*	HΣ
1890.33	159.8	0.35 ±	2*n*	HΣ
1890.92	170.0	0.19	2*n*	β
1891.27	171.5	....	3*n*	HΣ
1892.18	179.6	0.21	2*n*	β
1894.18	205.4	0.45 ±	3*n*	HΣ
1894.28	192.8	0.2 ±	3*n*	Com
1895.30	210.5	0.35 ±	4*n*	HΣ
1895.32	217.5	0.2 ±	2*n*	Com
1896.21	212.0	0.22	1*n*	Lewis
1896.24	204.1	....	1*n*	Dyson
1896.26	226.0	0.15 ±	1*n*	Com
1898.14	250.7	0.18	1*n*	A
1899.15	261.3	0.22	3*n*	A
1899.23	263.5	0.21	4*n*	Lewis
1900.18	293.4	0.13	3*n*	A

1900.23	267°.2	0″.20	1n	Lewis
1901.28	280.6	0.11	2n	Lewis
1901.30	272.3	0.18	3n	Bryant
1902.24	24.7	0.2±	4n	Lewis
1903.06	132.1	0.19	3n	A
1903.28	26.6	0.34	1n	Bowyer
1904.05	147.2	0.25	3n	A
1904.94	154.8	0.23	2n	A

From the measures to 1903 Aitken finds a period of 15.7 years.



є Hydrae. AB and C

The Struve companion, C, has a slow direct motion about AB, the distance for seventy years remaining practically constant. On the hypothesis of uniform motion, this member of the system would have a period of about 650 years.

1830.60	195°.6	3″.20	9n	Σ
1843.31	203.5	3.50	2n	OΣ
1848.97	208.5	3.27	3n	OΣ
1861.62	211.0	3.43	3n	OΣ
1868.88	217.5	3.44	3n	OΣ
1873.09	218.5	3.35	6n	Δ
1878.33	224.5	3.32	3n	Hl
1883.81	226.3	3.42	7n	Hl
1888.26	227.4	3.30	4n	Hl
1889.08	226.5	3.16	3n	β
1894.93	229.3	3.48	6n	HΣ
1899.24	233.9	3.46	5n	Doo
1903.24	234.5	3.31	2n	Biesbroeck

The fourth star, D, also appears to be a member of the system, since it has the same proper motion as the large stars. This is given from the meridian observations:

Stumpe	0″.202 in 264°.3
Auwers	0.211 in 258.8
Bossert	0.209 in 264.5

The following, which are all the measures, show no relative change:

1878.33	193°.9	19″.78	1n	Hl	
1878.60	192.0	20.05	2n	β	
1885.25	193.8	19.80	4n	Hl	
1889.22	193.8	19.68	2n	β	...13.0
1899.18	195.5	19.97	1n	A	...13.0
1899.23	194.6	20.36	2n	Doo	
1905.14	194.2	19.25	1n	β	

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...J2...J3...WJ3...Fl...P2...Bp...Da2...Da3...Wr...Ra (**XXIII, XXX, XXXI, XXXVIII, XXXIX**)... H (**VII**)... Se... Se2...Se3...Se (1614)...Hd...Ba (**II, IV**)...Δ (1110, 1256, 1474, 1735, 2077)... Δ (*Mem. Accad. Sci.*)... Δ (**I, II**)...WS...WS2...Gl...Sk...Sk2...Sk3...Pl...OΣ (**IX**)...Du...K (1519)...Sp (2133)...Sp (**II**)...Sp (**II**, App)...Do (2197) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Flm...Bru2...Pk...Je (2347, 2449)...Hl (*Wash. Obsns.* 1880, 1883-4)...Hl (**I, II**)...Per...Per (2684)...En (1673, 2663)..Big...T (2898, 3185)...Jones (*A. J.* 312)...Lv1 Maw (**I, III**)....β1....β3....β (2930, 3048, 3141) (*Sid. Mess.* **VIII**, 207) (*Mon. Not.* **LI**, 391) (*Pub. L. O.* **II**)....Glasenapp (**III**)....Com (*Pub. Washburn Obsy.* **X**)...Knorre (3300)...Searle (*A. J.* 299)...Coleman (*Mem. R. A. S.* **LIII**)...A (3584, 3638) (*A. S. P.* **XI**, 45) (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Boeger (*A. J* 522)...Je (3802)...Biesbroeck...β6...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 386; **LXIII**, 403; **LXIV**, 795)...A (*Pub. A. S. P.* **XV**, 84) orbit...Salet (*Bul. Ast.* **XXII**, 108)...]

(See p. 1071)

4772. **See 105.** Later measures at the Lowell Observatory are: 40m 28s

AB	1899.97	117°.0	20″.85	3n	Cg	...13.5
AC	1899.97	147.1	20.62	3n	Cg	...13.5
AD	1899.97	248.9	23.36	2n	Cg	...13.5

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

4774. **Σ 1276.** (= S 581.) Unchanged. 40 38

1867.38	354°.0	12″.50	3n	Δ
1894.37	353.4	12.80	2n	Leip

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Da2...H (**VII**)...Ra (**XXIV**)...Δ (1204)...Δ (**I, II**)...*A. G. Leipzig*, p. 208...]

4775. **Σ 1277** *rej.* Only the following since Struve: 40 38

1905.14	272°.6	15″.97	1n	β6	9.0...9.2

4776. **Σ 1272.** Unchanged. 40 44

1867.05	342°.8	20″.29	3n	Δ

[Ma (*F. S.* **II**)...Δ (**II**)..]

4777. **Σ 1271.** Probably no motion. 40 58

1868.23	62°.8	1″.38	3n	Δ
1898.33	64.6	1.25	3n	Doo

[Ma (**XI**)...Δ (**II**)...Ma (*F. S.* **I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

4778. **Σ 1274.** Unchanged. 41 16

1867.77	41°.6	8″.79	4n	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)....H (**V**)...Δ (**II**)...]

4779. **H 4135.** The only measures are: 41 19

1904.45	53°.2	42″.19	2n	β6	7.6...12.7

4782. **Σ 1281.** The change is due to proper motion. 41 26

1833.48	329°.6	25″.02	5n	Σ
1865.16	323.7	29.60	4n	Δ
1878.09	321.3	31.18	1n	β
1897.80	319.2	35.10	4n	Doo
1903.02	318.9	35.40	4n	β

The five sets of measures give for the proper motion of A, 0ʺ.173 in 115°.7. From the meridian positions this value is, 0ʺ.151 in 135°.4 (*A. G. Nico.*).

[Ma (*F. S.* **II**)...Ma (**XIII, XV**)...Hd...Flm...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (1572)... Δ (**II**)... Sk^3...β^1... Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

41^{m} 49^{s} **4783.** *Monocerotis* 237. **β** 586. Discovered with the 18½-inch. Probably unchanged. In *Hydra*, according to Gould, 6.7m. Lalande 17355.

1878.26	45°.7	0ʺ.54	1*n*	Δ
1887.75	55.4	0.66	3*n*	Sp
1898.19	56.8	0.63	1*n*	See

[β (**X**)...β^1... Δ (**I**)...Cin^5...Sp (**III**)...See ( )...]

41 49 **4784.** **Kr 32.** Noted as double in *A. G. Hels.*

1898.35	191°.8	4ʺ.57	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

41 58 **4785.** **β 335.** Discovered with the 6-inch. The *p* of three stars in the field. Without relative motion.

1879.26	268°.7	3ʺ.09	2*n*	OΣ
1886.30	269.2	2.77	2*n*	HΣ
1892.06	270.1	2.58	3*n*	β
1899.09	265.8	2.74	1*n*	β

[β (**VI**)...β (2062, 3141) (*Pub. L. O.* **II**)... Δ (**I**)...OΣ (**X**)...HΣ (**XII**)...]

42 5 **4786.** *ρ Hydrae.* **A. G. Clark 3.** Discovered by Alvan G. Clark with the McCormick 26-inch. The large star has a proper motion of 0ʺ.044 in 241°.5 (Auwers), and the companion may be moving with it. These are all the later measures:

1900.17	146°.4	12ʺ.51	2*n*	A
1902.01	146.0	12.04	2*n*	β

[β^1...A (*Bul. L. O.* No. 11)...β^5...]

42 8 **4787.** **OΣ 194.** Without change.

1868.65	56°.3	12ʺ.39	3*n*	Δ
1898.13	56.1	12.75	3*n*	Hu

[OΣ (**IX**)... Δ (**I**)...Ma (**XI, XIII**)...Hu (*Pub. L. O.* **V**)...]

42 9 **4788.** **Σ 1275.** (AC = **H 2466.**) H says nothing about the close pair, and the distant star is not mentioned by Σ. Examined and the principal stars of both pairs found to be identical. No change in AB.

1866.37	196°.8	2ʺ.06	3*n*	Δ
1905.13	197.6	1.74	2*n*	Miller

The only measure of the distant star is:

1905.13	81°.4	38ʺ.40	2*n*	Miller	...13

[Ma (*F. S.* **II**)...OΣ (**IX**)... Δ (1204)... Δ (**I, II**)...]

42 10 **4789.** **Σ 1279.** No change.

1867.46	88°.7	1ʺ.34	3*n*	Δ
1902.73	91.2	1.53	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se... Δ (**II**)...]

4790. **Σ 1278.** No change. The larger star is given a proper motion of 0ʺ.087 in 38°.6 (*A. G. Harvard*). 42^{m} 14^{s}

1867.72	124°.9	8ʺ.43	3*n*	Δ
1902.73	125.2	8.49	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**V**)... Δ (**II**)...]

4791. **H 106.** Certainly an error in this place. There is no bright star here, nor any in the star catalogues. Looked for twice without success. 42 27:

4792. **H IV. 118.** The place from H is erroneous. This pair is identical with Σ 1266 (see No. 4741). 42 30:

4793. **W. Z. 3.** Noted as "double" in *Washington Mer. Cir. Zones.* Measures from Cin^4. This is 7.5 m in Cord. DM (27°) 5927. 42 33

4795. **β 1068.** Discovered with the 36-inch. The change, if any, is slow. The following are all the later measures: 43 2

A and B

1890.24	190°.1	0ʺ.4 ±	1*n*	Sp
1893.25	190.3	0.25 ±	2*n*	Sp
1894.25	188.9	0.25 ±	2*n*	Sp
1900.21	181.1	0.35	1*n*	A
1901.87	183.1	0.37	5*n*	Gr. Obsy.
1904.96	184.2	0.24	1*n*	A

AB and C

1899.02	313°.4	17ʺ.85	1*n*	β
1903.28	310.9	17.58	1*n*	Bowyer

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...Sp (**III**)...Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIV**, 794)... A (*Bul. L. O.* No. 11)...]

4797. **A. G. 155.** Double in *A. G. Berlin.* "Not double," Cogshall (*A. J.* 546). 43 10

4798. *Lyncis* 130. **Σ 1282.** (= **S 582.**) Fixed. 43 13

1866.26	277°.5	3ʺ.49	3*n*	Δ
1890.11	277.0	3.57	4*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**X**)...Bp...Ba (**II, III**)...Wr...Se...Da^3...Ra (**XXIII**)... Gl... Du... Per... Per (2684)... Δ (**I, II**)... Δ (1119)... Giacomelli (**II**)... Glasenapp (**II, III**)... Ho (3558)... Coleman (*Mem. R. A. S.* **LIII**)... Knorre (3632)...]

4800. **Σ 1283.** (= **H IV. 111 = Sh 97.**) Fixed. 43 15

1866.04	123°.3	16ʺ.39	3*n*	Δ
1889.24	123.1	16.29	2*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...Ba (**II**)...En...H (**VII**)...Se^1...Se^3... Δ (1026)... Δ (**I, II**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

4802. **A. G. 156.** Double in *A. G. Lund.* Measures by β^6. 43 19

43^{m} 27^{s} **4804.** **A. G. 157.** Double in *A. G. Berlin.* Measures by Kustner.

[Ku (3821)... Miller (*A. J.* 546)...]

43 41 **4806.** **β 1069.** Discovered with the 36-inch.

1899.56	60°.1	2″.25	2*n*	A

[β (**XV**)... β (2929) (*Pub. L. O.* **II**)... A (3638)...]

43 41 **4808.** **Ho 40.** The only later measure is:

1896.26	279°.1	0″.58	1*n*	Ho

Ho measures a 13 m star, 140°.2 : 36″.31 (1896.26) 1*n*.

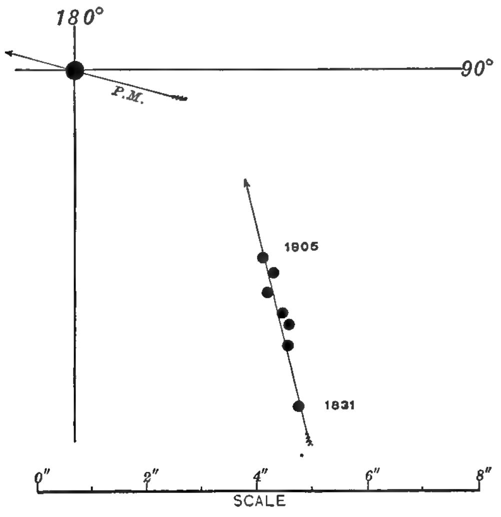
[Ho (2778, 3558)...]

44 8 **4812.** **Ho 356.** Later observers make the distance much larger.

1898.20	270°.2	1″.46	1*n*	See
1899.27	271.8	1.29	3*n*	A

[Ho (3233)... A (3638)...]

44 22 **4815.** **Σ 1280.** (= **H N. 144 = Sh 96.**) Interesting pair from the large proper motion of both components. As the relative change is rectilinear, it is apparently a system of the 61 *Cygni* type. The proper motion from meridian observations is given:



Σ 1280

Kustner	1″.371 in 254°.4
Porter	1.399 in 255.9

1831.90	33°.9	7″.43	4*n*	Σ
1867.30	37.9	6.43	5*n*	Δ
1873.83	40.1	6.14	6*n*	Du
1883.44	40.6	5.88	5*n*	En
1898.17	41.1	5.43	3*n*	Doo
1902.73	44.4	5.25	1*n*	Hu
1905.18	44.8	4.49	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... *Gr. Obsns.* 1840... Ra (**XXIV**)... Bl (**V**)... Δ (1110, 1572)... Δ (**I, II**)... Wr... Du... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Fedorenko (1062)... Seagrave (*Sid. Mess.* **II**, 22)... En (2663)... Doolittle (*Pub. Flower Obsy.* **I**)... *Annals Toulouse Obsy.* **III**... Boeger (*A. J.* 522)... β^6...]

4816. **H 107.** The star has some proper motion: 44^{m} 23^{s}

Bossert	0″.15 in 180°.0
Porter	0.128 in 159.4

The only measures are:

1902.56	54°.2	26″.83	2*n*	β^6	7.6...11.2

4817 **Σ 1268** *rej.* From H (V). The magnitude in *Catalogus Novus* and DM is 9. 44 24

4818. **Σ 1285.** Probably unchanged. 44 26

1869.17	338°.3	25″.83	4*n*	Δ
1903.06	338.4	26.07	2*n*	β

[Ma (*F. S.* **II**)... Ma (**XIII**)... Flm... Δ (**II**)... β^6...]

4819. **OΣ (App) 96.** The proper motions of these stars is given by Rechenberg (3284): 44 48

A = 0″.082 in 284°.2
B = 0.127 in 259.1

The measures show only a slight increase in the distance, and therefore both stars must have practically the same movement. B is DM (26°) 1854. The following are all the measures since Dembowski:

AB	1892.70	313°.3	42″.75	2*n*	Franz
	1903.80	313.2	43.29	2*n*	β
AC	1903.80	260.8	34.04	2*n*	β

[Δ (**I**)... Franz (3464)... β^6...]

4820. **Perrotin.** Discovered by Perrotin at the Nice Observatory. In DM 8.2 m. The proper motion is given: 44 49

Bossert	0″.180 in 260°.4
Glasgow	0.175 in 261.8

So far there is no change:

1889.12	350°.1	0″.95	3*n*	β	7.9...8.6
1896.19	348.7	0.65	2*n*	Lewis	
1901.69	351.8	0.75	4*n*	Bowyer	

[Per.... β (2930) (*Pub. L. O.* **II**) .... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 500; **LXII**, 383; **LXIII**, 403; **LXIV**, 795)...]

4821. **Σ 1287.** The faint star is not in Σ. Very little change in the close pair. 44 53

1843.28	102°.4	1″.48	1*n*	Ma
1865.71	96.6	1.80	6*n*	Δ
1877.21	94.0	1.56	3*n*	Sp
1883.72	101.2	2.14	5*n*	En
1895.29	96.4	2.08	2*n*	HΣ
1900.28	92.5	1.79	2*n*	Doo

The only later measure of the small star is:

1900.28	117°.0	15″.15	2*n*	Doo	...10.7

[Ma (*F. S.* I) ... Ma (**XI, XIII**) ... *Δ* (1474) ... *Δ* (**II**) ... Flm ... Pt ... Sp (**II**) ... Gore (*Mon. Not.* **XLVII**, 61) ... En (2663) ... HΣ (**XII**) ... Big (*Bul. Ast.* **XII**, 299) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

45^m 10^s **4822.** 51 *Cancri.* **S 583.** (= **H̥ VI. 86 = σ 312.**) Called σ^1 *Cancri* by South, but only 51 *Cancri* in B. A. C. Auwers gives the principal star a proper motion of 0″.029 in 5°.0. The small star not in DM. The only measures since South are the following:

1902.90	23°.5	79″.10	2*n*	β^6	...9.6

45 16 **4823.** 53 *Cancri.* **H 460.** This star is 6.5 m in DM, and is given by Espin (2919) in a list of stars with remarkable spectra. 55 *Cancri*, 12^s *f* and 4′ *n*, has a proper motion of 0″.561 in the direction of 246°.0. 53 *Cancri* is not in Heis as a naked-eye star. The proper motion is small, 0″.024 in 309°.2 (Auwers). The only measures are:

1903.80	332°.4	43″.14	2*n*	β^6	...10.7

45 28 **4824.** **H 4143.** Probably fixed.

1884.10	131°.9	3″.11	1*n*	W	9.0...9.3
1898.20	130.3	3.41	1*n*	See	

[Cin 4 ... Wilson (Cin 10) . . Innes (*Southern Double Stars*, p. 312) ...]

45 32 **4826.** **Σ 1288.** Fixed.

1868.91	259°.1	7″.31	4*n*

[Ma (*F. S.* I) ... Ma (**XI**) ... Wr ... *Δ* (**II**) ...]

45 41 **4828.** 15 *Hydrae.* **β 587.** The duplicity of the principal star was discovered with the 18½-inch. The measures show retrograde motion, and the components have the same proper motion. Auwers gives this as 0″.069 in the direction of 270°.0.

The later measures are:

A and B

1878.37	163°.6	0″.37	1*n*	Cin	6.0...8.0
1879.18	157.7	0.47	2*n*	β	5.7...7.2
1892.10	151.9	0.59	3*n*	β	6.3...8.2
1893.85	149.2	0.55	5*n*	Sp	
1897.25	143.4	0.93	3*n*	A	
1901.31	137.6	0.73	1*n*	Bryant	
1903.21	141.1	0.83	3*n*	Doo	

AB and C (= H̥ V. 120)

1878.14	356°.8	45″.75	1*n*	β	
1892.06	357.3	45.35	2*n*	β	...10.6
1899.02	358.2	45.45	1*n*	β	... 9.2

AB and D

1892.06	53°.2	50″.24	2*n*	β
1899.02	53.0	50.76	1*n*	β

[β (**X**) ... β^1 ... β^3 ... β (3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... Cin 5 ... A (3465) ... Sp (**III**) ... Doolittle (*A. J.* 547) ... Bryant (*Mon. Not.* **LXII**, 383) ...]

4829. **Σ 1290.** Probably unchanged. 45^m 45^s

1867.49	317°.4	3″.08	3*n*	*Δ*
1899.28	315.6	2.74	1*n*	Bryant

[Ma (*F. S.* I) ... H (**V**) ... Ma (**XI**) ... Se ... *Δ* (**II**) ... Bryant (*Gr. Obsns.* 1899) ...]

4830. **Jacob 4.** No. 112 of J^2 Looked for twice in 1876, 45 47: but not found. Nothing in O. Arg. S. in this place. Undoubtedly it is H 4162, with error of 10^m R. A. in Jacob. (See No. 4900.)

4831. **β 407.** Discovered with the 6-inch. Evidently 45 50 unchanged.

1879.52	164°.5	5″.94	3*n*	β
1890.20	161.4	6.01	2*n*	T
1899.09	164.8	5.78	1*n*	β

[β (**VII**) ... β (2103) ... β^3 ... β (*Pub. Y. O.* **I**) ... *Δ* (**I**) ... Cin 5 ... T (3186) ...]

4832. **Schj. 11.** Distance estimated 1″ by Schjellerup. 46 4

1886.17	352°.8	2″.21	1*n*	Wilson

[Schj (1485) ... Hd ... *Δ* (**I**) ... Cin 5 ... LM ... Wilson (Cin 10) ...]

4833. **A. G. 158.** Double in *A. G. Harvard.* Measures 46 9 by Espin (*Mon. Not.* LXII, 532).

4835. **Σ 1289.** (= **H̥ I. 85.**) No evidence of change. 46 44 The pair in the field *f* measured in Wr is Σ 3120.

1866.82	3°.7	3″.73	3*n*	*Δ*

[Ma (*F. S.* I) ... Ma (**XI**) ... Wr ... Se ... *Δ* (**II**) ...]

4838. **H 4146.** Error of 1^m R. A. in H. Heis 6–7 m. 46 48 Small star very plain with 6-inch (1876).

1901.18	103°.0	33″.84	2*n*	β^6	6.7...12.0

4839. ι^2, 57 *Cancri.* **Σ 1291.** (= **H̥ I. 30 = Sh 98.**) 46 55 Called σ^2 *Cancri* in B. A. C. Very slow motion in the angle, and without sensible change in distance. The system has a proper motion of 0″.022 in 111°.2 (Auwers).

1782.28	338°.2	....	1*n*	H̥
1866.18	331.1	1″.33	3*n*	*Δ*
1878.22	330.4	1.43	4*n*	Je
1886.33	327.8	1.30	3*n*	Hl
1889.30	326.7	1.40	3*n*	Maw
1899.26	325.8	1.47	3*n*	A
1903.29	325.9	1.38	2*n*	Biesbroeck

[Ma (*F. S.* I) .... Ma (**X, XI, XIII**) .... Wr .... Ra (**XXIII**) .... *Δ* (1119, 1256) .... *Δ* (**I, II**) ... OΣ (**IX**) ... Ferr ... Du ... Bl (**V**) ... Se ... Se^3 ... Je (2347, 2449) ... Sp (**II**) ... Sp (**II** App.) ... K ... Kustner (2584) ... Per ... Per (2684) ... En (2663) ... T (2866) ... Ho (2978) ... Hl (*Wash. Obsns.* 1886) ... Hl (**II**) ... Sk^3 ... Sk^5 .... Big .... Jones (*A. J.* 312) .... Maw (**I**) .... Lewis (*Mon. Not.* **LIV**, 315) .... Glasenapp (**II, III**) ... Collins (*A. J.* 378) ... Morgan (*A. J.* 439) ... Brown (3645) .... Knorre (3518) .... Coleman (*Mem. R. A. S.* **LIII, LIV**) .... A (3638) .... Do (3799) ... Je (3802) ... Giacomelli (**II**) ... Biesbroeck ...]

47^m 0^s **4840.** **H** 1163. The only measures are:

1900.11	172°.1	16″.88	*2n*	Es	9.0...9.2

[Espin (3717)...]

47 32 **4841.** **OΣ** 195. Relatively fixed.

1867.61	138°.7	9″.33	*4n*	Δ
1898.15	138.5	9.73	*3n*	Hu

[Ma (**XI, XIII**) ... Se ... Se^2... Da^3... OΣ (**IX**) ... Ba (I) ... Δ (**I**) ... Per ... Per (2685) ... Sp (**II**) ... T (2899) ... Hu (*Pub. L. O.* **V**) ... Biesbroeck ...]

47 39 **4842.** **Σ** 1292. (= **Hd** 120.) Fixed. The proper motion is 0″.08 in 360° (*A. G. Nico.*).

1867.58	188°.4	5″.86	*3n*	Δ
1904.04	188.7	6.00	*2n*	β

[Ma(*F. S.* **I**)...Ma(**XI**)...H (**VII**)...Se...Δ(**II**)...Cin^5...β^6...]

47 43 **4843.** **H** 109. (= **Ku** 34.) The only measures are:

1901.65	101°.7	10″.66	*2n*	Ku	10.2...10.4

[Kustner (3821)...]

47 48 **4844.** **Ho** 357. Later measures show a decided change in the distance.

1904.12	7°.1	37″.10	*4n*	Doo

[Ho (3233)...]

47 52 **4845.** **A. G.** 159. Double in *A. G. Leiden*. Measures by β^6.

48 5 **4846.** **Σ** 3120. No motion. Doolittle measures a 13.5 star, not previously seen, 116°.6 : 8″.09 (1898.28) 1*n*.

1867.55	348°.0	1″.38	*3n*	Δ
1898.21	350.4	1.56	*4n*	Doo

[Wr...Δ (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

48 22 **4848.** **H** 1162. "? if P. D. be not 1° less." Rad. 2219 (8.6) is 1^m 32^s *p* the place given.

48 24 **4849.** **β** 24. Discovered with the 6-inch. No evidence of motion. Some of the later positions are:

1878.19	177°.3	1″.12	*1n*	β
1888.91	173.8	1.19	*4n*	Lv
1890.22	170.5	1.23	*3n*	T
1893.22	177.4	1.06	*2n*	J

[β^1...β (*Mon. Not.* **XXXIII**, 351) ... Δ (**I**) ... Cin^5... LM ... Lv^1 ... T (3186)... Jones and Collins (*Proc. Haverford Coll. Obsy.* 1892)(*A. J.* 212, 278)...]

4851. **β** 408. Discovered with the 6-inch. Probably no change. 48^m 58^s

1879.35	346°.7	2″.94	*1n*	OΣ
1883.64	345.7	3.50	*5n*	En
1886.35	342.3	3.01	*2n*	HΣ
1898.15	340.6	3.34	*4n*	Doo

[β (**VII**)....β (2103)....Δ (**I**) ...En (2678)....OΣ (**X**)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy.* **I**)...] (See p. 1071)

4852. **Hd** 120. Nothing in this place. It is **Σ** 1292. (No. 4841.) 49 ·

4853. **β** 103. Discovered with the 6-inch. So far relatively fixed. 49 2

1879.52	73°.9	2″.86	*3n*	β
1898.20	71.0	3.11	*3n*	Doo

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β^3...Δ (**I**)...Wilson (Cin^{10})...Doolittle (*Pub. Flower Obsy.* **I**)...Pt...] (See p. 1071)

4854. **S** 585. The angle in South should be reversed. These stars are Lalande 17636 and 17638. B is O. Arg. S. 9134. 49 4

1901.18	146°.9	66″.83	*2n*	β	6.0...6.3

[H^3...β^6...]

4855. **H** 2473. The only measures are: 49 7

1900.11	244°.7	17″.16	*2n*	Es	8.4...12.6

[Espin (3717)...]

4857. **S** 584. These stars are SD (10°) 2692 and 2691. The later measures give a much smaller distance. 49 32

1903.17	213°.6	67″.58	*2n*	β^6	7.5...8.5

4859. 17 *Hydrae*. **Σ** 1295. (= **H** II. 77 = **Sh** 99.) Fixed. The principal star has a proper motion of 0″.027 in 248°.4 (Auwers). 49 37

1867.21	358°.2	4″.16	*3n*	Δ
1885.64	358.9	4.33	*2n*	Per
1903.27	360.0	4.37	*5n*	Jouffray

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**V**) ...Wr... Se... Se^3... Δ (1026, 1256)... Δ (**I, II**) ... Δ (*Mem. Accad. Sci.*)... Ra (**XXIII**)... Cin^3... Cin^5... Cin^6... Cin (2201)....Pt.... Per.... OΣ (**IX**)....Wilson (Cin^{10}).... Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Do (3799)...Scott (*Mon. Not.* **LXIV**, 52)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

4860. **Σ** 1284. Apparently fixed. 49 39

1867.79	167°.4	2″.36	*3n*	Δ
1882.17	168.4	2.51	*4n*	Big

[Ma (*F. S.* **I**)...Δ (**II**)...Big...]

4861. **Σ** 1294 *rej.* Measures from H (V). In H (VIII) 9.5...11. Double in A. G. 49 52

50m 23s **4862.** δ *Pyxidis.* **See 107.** This is o^4 *Argus* of Heis and Arg., and *d Mali* in *Cape Catalogue* and Rad^8

1899.73	268°3	23″82	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

50 35 **4863.** **Σ 1293.** Fixed.

1866.97	92°4	18″56	3*n*	Δ

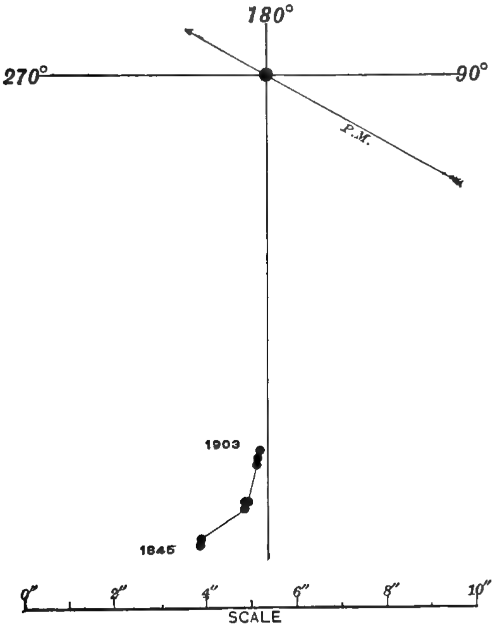
[Ma (*F. S.* **II**)...Δ (**II**)...]

50 41 **4864.** **Ho 252.** No other measures.

[Ho (2977)...] (See p. 1071)

50 59 **4866.** ι *Ursae Majoris.* **Hu 628.** (AB = **OΣ 196** = **H 2477.**) The Herschel companion to this star was found to be a close pair by Hussey in 1903. As it was not seen by him on four nights in 1898 in measuring the wide pair, it may be in rapid motion.

1905.32	195°4	0″68	1*n*	β



ι Ursae Majoris

The large star has a large proper motion:

Auwers	0″503 in 240°6
Newcomb	0.500 in 240.1
Bossert	0.503 in 240.4

The double companion is moving in space at or nearly the same rate. The apparent change may be rectilinear, but the measures of distance are too uncertain to decide in regard to this.

Some of the measures are the following:

A and BC

1845.27	351°8	10″70	4*n*	OΣ
1851.68	351.8	10.54	5*n*	OΣ
1868.61	356.9	9.61	4*n*	Δ
1871.80	356.9	9.78	2*n*	OΣ
1879.29	357.3	9.61	2*n*	Hl
1883.40	356.7	9.56	5*n*	En
1889.70	358.2	8.79	3*n*	Maw
1898.26	358.4	8.65	4*n*	Hu
1903.34	358.7	8.45	3*n*	Biesbroeck
1905.26	360.1	8.17	2*n*	β

[H (**V**)...Ma (**XIII**)...Mu...Bru^2...OΣ (**IX**) (**X**, pp. 79, 193)...Hl (**I, II**)...Δ (**I**)... Seagrave (*Sid. Mess.* **II**, 22)...Sadler (*Ast. Reg.* **XXIII**, 117)...Do (2322, 3930) Pk ... Kustner (2584) ... Flm ... En (2678) ... Maw (**I**) ... Peters (*Recueil de Mem. des Astr. de Poulk.* p. 136)...Glasenapp (*Refraktsionnya Oklony*) parallax... Big (*Bul. Ast.* **XII**, 299) ... Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)(*Bul. L. O.* No. 57)...Boeger (*A. J.* 522)...Biesbroeck...β^6...]

4867. **β 210.** Discovered with the 6-inch. Evidently fixed. 51m 18s

1876.12	183°2	2″80	6*n*	Cin
1882.21	183.1	2.62	2*n*	Sp
1886.85	183.3	2.76	3*n*	LM
1898.09	183.5	2.56	3*n*	Scott
1903.32	182.0	2.72	5*n*	Jouffray

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Δ (**I**)... Cin^3 ... Cin^5... Cin^6...Wilson (Cin^{10})...LM...Sp (**II**)...Jones (*A. J.* 312)... Sellors (3240)...Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52) ... Do (3799)... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

4869. **Σ 1296.** Very little, if any, change. 51 47

1866.24	73°4	2″60	3*n*	Δ
1903.18	73.8	2.37	2*n*	Do

[Ma (*F. S.* **I**)... Ma (**XI**)... Du ... Sk^3... Pt ... Flm ... Δ (**II**) ... Collins (*A. J.* 378)....Bryant (*Greenwich. Obsns.* 1899)....Boeger (*A. J.* 522)....Sk^5.... Do (3930)...]

4870. α *Cancri.* **H 110.** There has been no change in the companion since the first measures. The proper motion of the large star is small, and somewhat uncertain in amount and direction. 51 54

Auwers	0″028 in 137°8
Newcomb	0.055 in 220.6

The following are all the measures:

1836.14	327°3	11″52	3*n*	Lamont	
1867.78	325.5	11.42	3*n*	Δ	...11.0
1876.76	324.1	11.63	2*n*	OΣ	...11.2
1879.13	325.0	11.07	3*n*	β	
1886.32	322.2	11.07	2*n*	HΣ	
1899.20	327.6	11.40	..	Gr. Obsy.	
1899.85	322.9	11.28	4*n*	Doo	
1902.53	324.6	10.90	5*n*	β	

[H (**V**)...Mu...Lamont (316)...Δ (**I**)...OΣ (**X**, p. 131)...β^3...Greenwich Obsy. (*Mon. Not.* **LX**, 518)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...β^6...]

4871. **Weisse 20.** Noted "duplex" in Weisse. This star is not double, and has no near companion. Examined many years ago with the 6-inch, and recently (1904) with the 40-inch. 51 59

52m 11s **4874.** 64 *Cancri.* **Sh 100.** (= H VI. 87 = σ 317.) In Sh called σ^8, but that in B. A. C. is 61 *Cancri.* H calls it σ. It has a proper motion of 0″056 in 246°9 (Auwers). The companion is DM (32°) 1820. The only measures since 1823 are the following:

1902.90	295°3	88″66	2*n*	β^6	...9.4

52 21 **4875.** **Ho 358.** The later measures are:

1899.27	297°7	1″94	3*n*	A

[Ho (3233) ... A (3638) ...]

53 8 **4876.** **Hu 718.** The mean of all the measures, including that in Part I, is:

1904.14	201°3	0″45	3*n*	Hu	8.7...8.9

[Hu (*Bul. L. O.* No. 65) ...]

53 14 **4877.** **Ho 359.** Without change.

1899.27	7°2	0″64	2*n*	A	8.6...9.1

[Ho (3233) ... A (3638) ...]

53 33 **4879.** **Ho 360.** The later positions are:

1902.10	149°7	3″89	3*n*	Doo
1904.09	152.0	4.24	1*n*	β

[Ho (3233) ... β^6 ...]

53 35 **4880.** **Σ 1297.** These stars are fixed, but appear to have a common proper motion of 0″052 in 195°4 (*A. G. Berlin*).

1867.04	159°8	4″74	3*n*	Δ
1904.10	159.4	4.70	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se^2 ... Δ (**II**) ... β^6 ...]

53 41 **4881.** **Σ 1299** *rej.* The only measures are:

1905.14	119°0	20″97	2*n*	β^6	8.6...9.3

53 46 **4882.** **H 111.** The only measures are the following:

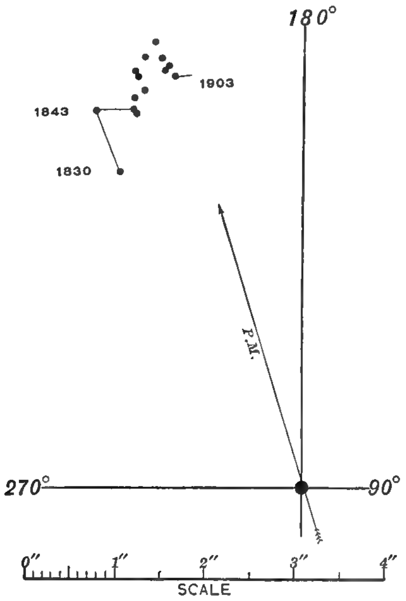
1904.03	243°5	24″46	2*n*	β^6	9.0...9.7

54 3 **4883.** 66 *Cancri.* **Σ 1298.** (= S 586.) The principal star has a proper motion of 0″039 in 324°6 (Auwers). No sensible change since Struve.

1865.76	137°1	4″46	3*n*	Δ
1889.68	137.8	4.64	6*n*	Giacomelli
1897.29	136.7	4.80	3*n*	Coleman

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... H (**VII**) ... J^2 ... Wr ... Se ... Se^3 ... Ra (**XXIV**) ... Δ (1119, 1256) ... Δ (**I, II**) ... Hd ... WS ... Gl ... OΣ (**IX**) ... Du ... Bl (**V**) ... Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (**II**) ... Per ... Per (2684) ... Giacomelli (**II**) ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ...]

54m 39s **4890.** **Σ 1300.** The components have a large common proper motion for stars of this magnitude, 0″329 in 196°3 (Battermann). The nature of the relative motion is not certain from the measures. The later measures make it probable that Struve's distance is too small.



Σ 1300

The following principal measures are shown on the diagram:

1830.79	210°0	4″11	3*n*	Σ
1843.18	208.6	4.83	2*n*	Ma
1856.58	204.2	4.67	3*n*	Se
1866.78	204.0	4.61	3*n*	Δ
1868.28	203.4	4.78	3*n*	OΣ
1876.76	198.4	4.93	2*n*	OΣ
1877.76	202.0	5.05	4*n*	Sp
1879.19	201.8	4.81	2*n*	Hl
1885.32	201.9	4.97	3*n*	Hl
1893.23	200.1	5.17	2*n*	Lewis
1895.29	198.3	5.08	2*n*	HΣ
1897.31	198.4	5.28	3*n*	Doo
1903.13	197.7	4.97	3*n*	Do
1903.86	197.3	4.85	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se^2 ... Se^3 ... En (1673, 2663) ... WS ... Gl ... Sk^2 ... Flm ... Peters (1695) ... OΣ (**IX**) (**X**, p. 162) ... Pt ... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... Sp (**II**) ... Jones (*A. J.* 312) ... HΣ (**XII**) ... Lewis (*Mon. Not.* **LIV**, 315) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Thiele (3837) ... Sk^5 ... Do (3930) ... β^6 ...]

54 39 **4891.** 67 *Cancri.* **Sh 101.** (= H VI. 41 = σ 319.) The small star is DM (28°) 1673, and it appears to have substantially the same proper motion as 67 *Cancri*, which Auwers gives as 0″119 in 218°0.

The following are all the other measures:

1782.28	320°5	95″98	1*n*	H
1888.32	324.3	101.46	2*n*	Eng
1904.63	324.7	101.72	2*n*	β

[Engelhardt (**II**) ... β^6 ...]

54m 51s **4893.** **Σ 1301.** No change since Struve.

1866.84	359°1	10″09	3*n*	Δ
1904.63	359.1	10.05	2*n*	β

[Ma (*F. S.* I)...Δ (II)...*Annals Toulouse Obsy.* **III**...β^6...]

54 54 **4894.** **Hu 719.** The mean of the measures, including that in Part I, is:

1903.29	288°7	0″53	3*n*	Hu	8.8...11.0

[Hu (*Bul. L. O.* No. 65)...]

54 55 **4895.** **β 409.** Discovered with the 6-inch. No change.

1879.52	184°7	9″77	3*n*	β
1899.07	184.1	9.66	1*n*	β

[β (VII)...β (2103)...β^3...Δ (I)...Pt...En (2678)...]

54 59 **4896.** **Σ 1302.** The distant star was added with the 18½-inch.

		A and B		
1867.87	232°3	2″33	3*n*	Δ
1880.53	232.9	2.07	3*n*	β
1904.22	234.0	2.39	1*n*	β
		A and C		
1904.25	267°6	32″06	1*n*	β

[Ma (*F. S.* I)...Se...Se^3...Ma (**XI**)...Cin^5...β^3...Δ (II)...T (3185)...β^6...]

55 2 **4897.** **Hu 720.** Discovered at the Lick Observatory.

1904.79	148°1	0″75	2*n*	Hu	8.5...8.8

[Hu (*Bul. L. O.* No. 65)...]

55 8 **4898.** **H 2478.** The only measures are:

1901.21	199°4	17″96	2*n*	Es	9.6...10.7

[Espin (*Mon. Not.* **LXIV**, 678)...]

55 41 **4900.** **H 4162.** No. 4830 is identical with this. The only measure is:

1904.11	224°9	5″40	1*n*	β^6	9.5...9.5

55 44 **4901.** *Hydrae* **68.** **β 211.** Discovered with the 6-inch. It is probably unchanged. Lalande 17831. In the field with Σ 1302.

1886.30	260°0	1″46	2*n*	HΣ
1890.20	262.5	1.12	2*n*	T
1892.25	264.3	1.02	2*n*	Sp
1893.26	261.2	0.99	4*n*	Sp

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (I)...Cin^5...Lv^1...OΣ (**X**)...T (3186) ...Sp (**III**)...HΣ (**XII**)...]

56 34 **4903.** **Hu 721.** Measured since Part I was in type.

1904.79	156°8	3″18	2*n*	Hu	9.0...11.0

[Hu (*Bul. L. O.* No. 65)...]

4904. **Innes 357.** Discovered by Innes at the Cape of Good Hope. 56m 40s

1902.12	178°0	0″68	2*n*	Innes

[Innes (*Mon. Not.* **LXI**, 589; **LXII**, 475; **LXIV**, 132)(*Annals Roy. Obsy. Cape* **II**, Part 4)...]

4907. **A. G. 160.** Double in *A. G. Lund.* Measures by β^6. 57 25

4909. **Σ 1303.** No change. 57 31

1867.44	278°3	2″92	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Δ (II)...]

4910. **Ho 41.** A 12.5 m star, 232° : 29″. 57 33

AB	1904.03	70°7	4″14	4*n*	Doo
AC	1904.03	231.6	28.15	3*n*	Doo

[Ho (2778)...]

4911. **S 588.** These stars are SD (17°) 2727 and 2726. 57 36

1905.14	327°6	30″64	1*n*	β^6	8.7...8.7

4914. **H 116.** The principal star is SD (2°) 2783. Magnitudes overrated by H. I found them 9 m in 1876. 58 7

1905.14	40°3	31″77	1*n*	β^6	9.0...9.1

4915. **Σ 1307** *rej.* From H (V). "Points to a third 10 m." The magnitude in DM is 9.0. 58 10

4916. **Hu 722.** Measured again since Part I was in type: 58 12

1904.79	217°8	0″54	2*n*	Hu	8.7...9.0

[Hu (*Bul. L. O.* No. 65)...]

4917. **H 2482.** No observations except this: 58 18

1835.2	273°7	8″ ±	H (VIII)	10 = 10

4918. **A. G. 161.** Double in *A. G. Leiden.* Measures by β^6. 58 19

4920. **Σ 1308.** (= **H 117.**) No change. 58 59

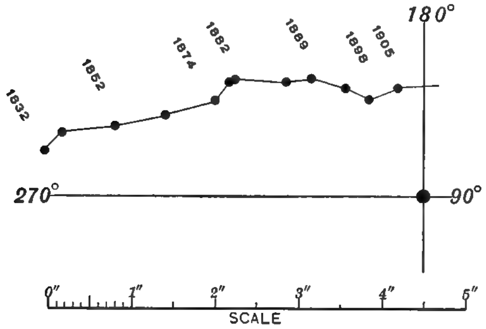
1867.23	85°1	10″35	3*n*	Δ
1879.71	85.2	10.68	2*n*	Cin

[Ma (*F. S.* I)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^5...Cin^6...]

4923. σ^2 *Ursae Majoris.* **Σ 1306.** (= **Ħ III. 54.**) So far the observations are satisfactorily explained by the theory of rectilinear motion. The principal star has a proper motion of 0″064 in 179°0 (Auwers). The motion of the companion is apparently a little larger, and in about the same direction. 59 50

The following positions are sufficient to show the apparent path of the companion:

1783.47	283°0	7″93	1*n*	H
1832.14	263.5	4.58	4*n*	Σ
1842.35	260.4	4.42	3*n*	OΣ
1852.88	257.5	3.80	2*n*	OΣ
1864.50	253.1	3.24	16*n*	Δ
1874.31	245.9	2.74	7*n*	Δ
1878.38	240.3	2.70	2*n*	OΣ
1882.86	238.6	2.65	7*n*	En
1887.38	231.0	2.13	1*n*	HΣ
1889.27	224.4	1.95	3*n*	Hl
1897.38	216.6	1.58	1*n*	Brown
1898.38	210.2	1.32	2*n*	Doo
1905.23	190.1	1.28	2*n*	β



σ² Ursae Majoris Σ1306

Herschel's measure of 1783 is not shown on the diagram. If this distance is substantially correct, it is very probable that the change is due to proper motion, and that this is a double of the 61 *Cygni* type.

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XIII, XV**) ... Σ^1 ... Bp ... Ba (**II, III**) ... Wr ... Da^3.... OΣ (**IX**) (**X**, p. 162) .... Se.... Se^3.... K (1519) .... Δ (1026, 1110, 1474, 1735, 2079) ... Δ (*Mem. Accad. Sci.*) ... Δ (**I, II**) ... WS ... Gl ... Flm ... Do (2316, 2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Pl ... Pk ... Sk ... Bl (**V**) ... Bru^2 ... En (1673, 2663) ... Big ... Seagrave (*Sid. Mess.* **II**, 22) ... Hl (**I, II**) ... Lv (*A. J.* 407) .... Brown (3645) .... Doolittle (*Pub. Flower Obsy.* **I**) .... HΣ (**XII**) ... Lewis (*Observatory*, Feb. 1895) ... Biesbroeck ... β^6 ...]

$59^m\ 52^s$ **4924.** **Σ 1310.** No material change.

1868.17	65°6	21″50	3*n*	Δ
1904.44	63.3	22.17	3*n*	Duncan

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ...]

59 55 **4925.** **A. G. 162.** Double in *A. G. Leiden.* Measures by β^6.

0 3 **4926.** **H 1164.** "A star 12m 20″ distant." The only measures are:

AB	1900.14	178°6	7″60	2*n*	Es	9.0... 9.1
AC	1900.14	272.0	29.43	2*n*	Es	...11.5

[Espin (3717) ...]

0 20 **4927.** **H 118.** A later observation is:

1834+	309°3	7″±	H (VIII)	10...11

$0^m\ 24^s$ **4928.** **Σ 1309** Fixed.

1866.18	273°1	11″29	3*n*	Δ
1893.19	273.2	11.58	2*n*	Gla

[H (**V**) .... Ma (*F. S.* **I**) .... Ma (**XI**) .... Δ (**II**) .... Wilson (Cin^{10}) .... Glasenapp (**II**) ...]

0 33 **4929.** *Cancri* 194. **Σ 1311.** (= **H III. 92** = **Sh 102.**) Relatively fixed, but common proper motion. This is given in *A. G. Berlin*:

A = 0″210 in 281°0
B = 0.208 in 278.3

1868.64	200°6	7″24	4*n*	Δ
1889.76	200.2	7.24	5*n*	Giacomelli
1898.25	200.6	7.15	6*n*	Coleman
1902.25	199.7	7.50	2*n*	Hu

Hough measures a distant companion not previously seen:

1892.77	118°0	27″31	2*n*	Ho	...13

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XIII**) ... Bp ... Da^3 ... Ba (**II, III**) ... Wr ... Ra (**XXIV**) ... Se ... Se^2 (called Σ 1131) ... Se^3 ... En (1673) ... Δ (*Mem. Accad. Sci.*) ... Δ (1036, 1110) ... Δ (**I, II**) ... Du ... Per ... Per (2684) ... T (3185) ... Glasenapp (**II**) .... Ho (3234) .... Giacomelli (**II**) .... Knorre (3518) .... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ...]

1 0 **4930.** τ *Ursae Majoris.* **H V.** 73. (= σ 321.) This star has a proper motion of 0″114 in 126°0 (Auwers). The only observation of the companion since 1783 is the following:

1902.93	48°7	57″22	3*n*	β^6	...10.6

The principal star is a spectroscopic binary, discovered by Reese at the Lick Observatory (*Pub. A. S. P.* XV, 21).

1 5 **4931.** **H 4172.** Probably fixed.

1848.10	219°9	6″44	1*n*	J	8½...9½
1880.22	217.4	7.03	1*n*	Cin	7.5...8.5
1902.12	217.7	6.75	2*n*	Do	

[WJ ... J^2 ... Cin^6 ... H^3 ... Do (3799) ...]

1 10 **4933.** **Σ 1305.** Apparently unchanged.

1868.56	5°2	1″60	3*n*	Δ

[Ma (*F. S.* **I**) ... Δ (**II**) ...]

1 16 **4935.** **Howe 23.** No change.

1900.23	307°9	3″08	2*n*	Lunt

[Cin^4 ... Lunt (*Mon. Not.* **LXI**, 589) ...]

1 17 **4936.** **OΣ (App) 97.** B is W^2 VIII. 1481. No change.

1904.84	57°4	51″50	1*n*	β

[Δ (**I**) ... Franz (3464) ... β^6 ...]

1 36 **4937.** **Schj. 12.** No motion.

1901.72	260°2	6″50	2*n*	β	9.1...9.2

[Δ (**I**) ... β^6 ...]

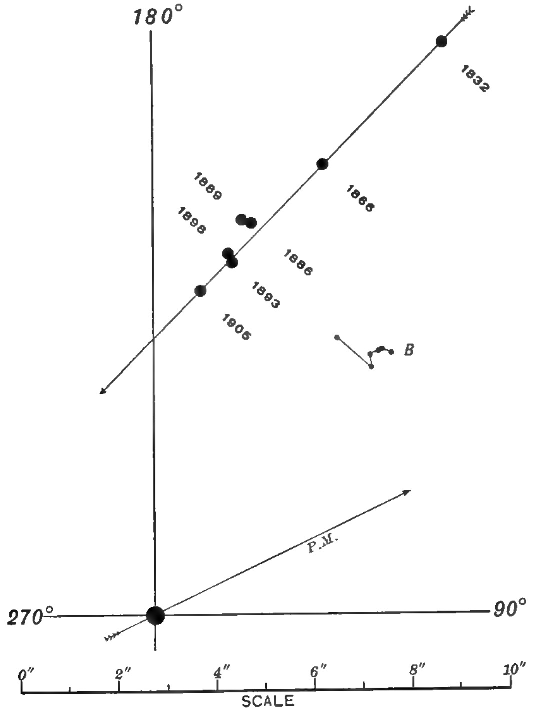
$1^m 46^s$ **4939.** **Σ 1312.** (= **S** 590.) Fixed. The proper motion is given, 0″.052 in 54°.8 (*A. G. Harvard*).

1868.10	148°.0	4″.49	4*n*	Δ
1904.99	148.9	4.37	1*n*	β

[Ma (*F. S.* I) ... Ma (**XI**, called Σ 1132) (**XIII**) ... Se ... Se³ ... Ra (**XXIV**) ... Δ (1205) ... Δ (**I, II**) ... Seagrave (*Sid. Mess.* **II**, 274) ... Du ... Espin (*Mon. Not.* **LXII**, 529) ... β⁶ ...]

1 54: **4940.** **H N. 30.** Described as "a very small and close double star." No pair of Class I in this place (1874). There is an error in H's position, which, from the absence of any description, it is impossible to correct with certainty, but this star may be No. 4925.

1 56 **4941.** **Σ 1316.** The principal star has a proper motion, which is given from the meridian observations 0″.107 in 115°.6 (Romberg). B is moving in space with A, while the change in C is due to the proper motion of the system. The measures of AC in 1832 and 1905 give 0″.096 in 135°.0 for the movement of A.



Σ 1316

A and B

1832.88	146°.3	6″.78	3*n*	Σ
1866.94	138.6	6.75	4*n*	Δ
1886.16	140.2	6.93	2*n*	LM
1889.25	139.5	7.07	2*n*	Hl
1898.16	137.6	7.22	3*n*	Doo
1905.09	138.5	7.10	3*n*	β

A and C

1832.88	153°.1	13″.05	3*n*	Σ
1866.94	159.3	9.91	4*n*	Δ
1886.16	165.9	8.26	2*n*	LM
1889.25	167.4	8.28	2*n*	Hl
1893.18	167.6	7.40	1*n*	Jones
1898.16	168.5	7.56	3*n*	Doo
1905.09	172.0	6.70	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XII, XIII, XV**) ... Se ... Se² ... H (**V**) ... WS ... WS² ... Gl ... Flm .... Sk .... Sk² .... Δ (**II**) .... Cin⁴ .... Cin⁶ .... LM .... Hl (**II**) .... T (2991, 3185) ... Jones (*A. J.* 312) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Bryant (*Mon. Not.* **LX**, 500) ... A (3638) ... Scott (*Mon. Not.* **LXIV**, 52) ... β⁶ ...]

4942. **H 804.** The only measures are: $1^m 56^s$

1903.93	329°.5	12″.73	2*n*	β⁶	8.1...11.0

4943. **A 123.** No other measures. 2 33

[A (3741) (*Bul. L. O.* No. 3) ...]

4944. **Σ 1313.** Some change is probable. 2 34

1845.84	242°.2	0″.87	4*n*	OΣ
1869.46	248.8	0.91	4*n*	Δ
1898.30	254.4	1.27	3*n*	Doo

[Ma (*F. S.* **I**) ... OΣ (**IX**) ... Δ (**II**) ... Flm ... Δ (1800) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

(See p. 1072)

4945. **Σ 1317.** (= **S** 591.) Fixed. 2 35

1866.43	61°.3	7″.54	3*n*	Δ
1893.15	61.6	7.60	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... H¹ ... H (**VIII**) ... Se³ ... Se ... Δ (**II**) ... Glasenapp (**II**) ... *Annals Toulouse Obsy.* **III** ...]

4946. **H 119.** Decl. in H about 3′ too small. Colors not very obvious (1876). The only measures are: 3 3

1905.04	328°.5	52″.97	2*n*	β⁶	7.7...10.3

4948. **Σ 1314** *rej.* The only position is: 3 7

1904.99	126°.9	36″.26	1*n*	β⁶	8.8...10.7

4949. *Ursae Majoris* 53. **Σ 1315.** (= **H N. 79** ≐ **Sh** 103.) Fixed. 3 12

1867.41	25°.7	24″.88	3*n*	Δ
1904.99	25.7	24.70	1*n*	β

[Ma (*F. S.* **II**) ... *Greenwich Obsns.* 1840 ... WJ² ... Ra (**XXVII**) ... Δ (1205) ... Δ (**I, II**) ... β⁶ ...]

4950. **Σ 1304.** (= **S** 587.) Fixed. 3 16

1867.84	318°.1	24″.23	3*n*	Δ

[Ma (*F. S.* **II**) ... Δ (**II**) ...]

$3^m\ 16^s$ **4951.** **OΣ 197.** No motion.

1869.67	60°3	1″50	5*n*	*Δ*
1898.15	61.3	1.43	3*n*	Hu

[OΣ (**IX**) . . . Ma (**XI, XIII**) . . . Da^3 . . . Se . . . *Δ* (**I**) . . . Per . . . Per (2685) . . . Hl (**I, II**) . . . T (3186) . . . Brown (3645) . . . Hu (*Pub. L. O.* **V**) . . .]

3 19 **4952.** **Hd 121.** Only approximate place in Hd. Identified and measured.

1904.26	202°8	14″54	1*n*	*β*^{6}	8.6 . . . 9.5

4 21 **4956.** **H 2483.** Nothing since 1830 but the following:

1880.26	193°7	15″54	3*n*	Big

4 30 **4958.** **β 410.** **B. A. C. 3127.** Discovered with the 6-inch. Unchanged. In Cord. G. C. 7.0 m.

1892.24	160°9	1″63	3*n*	Lv	7.3 . . . 9.2
1892.24	161.2	1.67	3*n*	*β*	7.6 . . . 8.6
1898.16	163.7	2.13	1*n*	See	

[*β* (**VII**) . . . *β* (2103, 3141) (*Pub. L. O.* **II**) . . . Cin^4 . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . See (   ) . . .]

4 34 **4959.** **H 4182.** I thought large star brighter, and distance less (1875). (See p. 1072)

4 43 **4961.** **Σ 1319.** Fixed.

1867.53	50°5	13″19	3*n*	*Δ*
1905.05	50.8	13.53	1*n*	*β*

[H (**VII**) . . . Ma (*F. S.* **I**) . . . *Δ* (**II**) . . . *A. G. Leipzig*, p. 248 . . . *β*^{6} . . .]

4 51 **4962.** 16 *Usrae Majoris.* **H V. 15.** (= σ 327.) Principal star 5 m in B. A. C. It has a proper motion of 0″033 in 204°1 (Auwers). There is some error in Herschel's identification of the star seen by him. 16 *Ursae* was examined twice with the 40-inch in 1902. It has no companion in the Herschel position, or elsewhere.

4 51 **4963.** *ε Mali.* **H 4183.** The only recent observation is:

1883.14	157°1	17″71	1*n*	Wilsón (Cin^{10})

4 56 **4964.** **H 2485.** "Extremely delicate." Distance and magnitudes underrated.

1903.90	156°1	7″17	1*n*	*β*^{6}	12.5 . . . 12.5

5 19 **4966.** **β 104.** Discovered with the 6-inch. Probably fixed.

1877.25	111°6	2″95	1*n*	CΣ
1886.31	106.8	3.35	1*n*	HΣ
1892.13	106.8	2.88	3*n*	*β*
1899.09	104.5	2.79	1*n*	*β*

[*β* (**II**) . . . *β* (*Mon. Not.* **XXXIII**, 437) . . . *β* (3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) . . . *Δ* (**I**) . . . OΣ (**X**) . . . Pt . . . HΣ (**XII**) . . .]

(See p. 1072)

4967. **Σ 1320.** Unchanged. $5^m\ 32^s$

1866.49	215°9	11″87	3*n*	*Δ*
1904.99	215.5	11.72	1*n*	*β*

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . *Δ* (**II**) . . . *β*^{6} . . .]

4968. **Σ 1318.** Unchanged. 5 33

1866.11	245°1	3″29	3*n*	*Δ*
1904.99	242.0	3.16	1*n*	*β*

[Ma (*F. S.* **I**) . . . H^1 . . . Ma (**XI**) . . . *Δ* (**II**) . . . *β*^{6} . . .]

4969. **Σ 1322.** Probably unchanged. 5 59

1859.48	57°2	1″83	5*n*	OΣ
1866.43	56.7	1.64	3*n*	*Δ*
1880.03	55.3	1.73	4*n*	Sp
1884.18	52.5	1.81	2*n*	Per
1893.14	56.0	1.77	2*n*	Gla
1895.25	55.0	1.65	2*n*	HΣ
1898.26	54.1	1.38	6*n*	Coleman

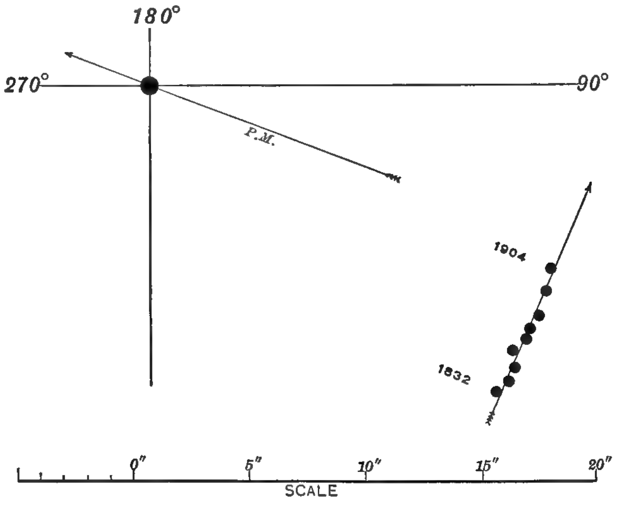
[Ma (*F. S.* **I**) . . . Ma (**XI, XII, XIII, XV**) . . . H (**VIII**) . . . Se . . . Se^3 . . . OΣ (**IX**) . . . *Δ* (1205) . . . *Δ* (**I, II**) . . . Gl . . . Per . . . Per (2684) . . . Sp (**II**) . . . WS . . . WS^2 . . . Glasenapp (**II**) . . . Coleman (*Mem. R. A. S.* **LIII, LIV**) . . . HΣ (**XII**) . . .]

4970. **β 336.** Discovered with the 6-inch. No relative motion. 6 11

1878.05	239°9	1″82	2*n*	Cin
1898.20	236.3	1.92	3*n*	Doo

[*β* (**VI**) . . . *β* (2062) . . . *Δ* (**I**) . . . Cin^4 . . . Cin^5 . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

4972. **Σ 1321.** A system of the 61 *Cygni* class, the relative change being produced by a small difference in the amount and direction of the proper motions of the components. Porter gives the motion of each star, 1″702 in 248°9. In *A. G. Harvard:* 6 23



Σ 1321

A = 1″711 in 249°1
B = 1.696 in 246.4

1832.96	48°4	20″10	3*n*	Σ
1840.32	50.5	20.18	3*n*	OΣ
1848.57	52.2	20.00	4*n*	OΣ
1855.17	53.6	19.59	4*n*	Δ
1863.12	55.7	19.73	5*n*	Δ
1871.24	57.3	19.67	3*n*	Du
1877.97	59.2	19.63	9*n*	Hl
1891.11	62.4	19.42	3*n*	β
1905.17	65.4	19.05	2*n*	β

[Ma (*F S.* **II**)...Ma (**IX, XI, XIII, XV**)...Bp...H (**V**)...Ba (**II, III, IV, V**)...Wn (**V**)...Wn (1738)...Ra (**XXIII**)...Δ (1026, 1256, 1474)...Δ (*Mem. Accad. Sci.*) ...Δ (**I**, pp. 57, 410)(**II**)...K (1519)...Da³...Du...Flm...Gl...Do (2197, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Hl (**I**)...Fedorenko (1062)...Pl...Je (2347)...En (2662)...Sk³...Goldney (2257)...Seagrave (*Sid. Mess.* **II**, 22)....Big....OΣ (**IX**)(**X**, p. 204)....Kapteyn (2935) parallax....Bryant (*Mon. Not.* **LX**, 500; **LXII**, 383)...β (*Sid. Mess.* **X**, 168)...β (3114)(*Pub. L. O.* **II**)...Engelhardt (**III**)...Espin (*Mon. Not.* **LXII**, 529)...β⁶...]

$6^m\ 23^s$ **4973.** **H** 807. H (V) 272°0: 12″±: 9-10...10 (1830+); no mention of C.

6 33 **4975.** **Σ** 1323 *rej.* Discription from H (VII). Magnitudes in Σ, 8...10; in DM, 8.8.

1904.99	212°7	19″78	1*n*	β⁶	8.7...9.5

6 37 **4976.** **A. G.** 163. Double in *A. G. Berlin*. Measures by Miller (*A. J.* 546).

6 49 **4977.** **Ho** 42. The only other measures are:

1903.32	10°1	1″21	4*n*	Doo

[Ho (2778)...]

6 59 **4978.** **Σ** 1324. Probably fixed.

1865.51	349°6	11″19	3*n*	Δ
1893.14	350.2	11.27	2*n*	Gla
1904.99	351.5	11.71	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (2194)...Δ (**II**)...Flm...Glasenapp (**II**)...β⁶...]

9 **4979.** **H** 121. "Both red. Observed long and attentively; remained satisfied of its being double after trying a variety of diaphragms." I could not find any double star here in 1875 with the 6-inch, nor with the 18½-inch in 1878 on a moderately good night. Looked for again in 1903 with the 40-inch.

7 9 **4980.** **H** 122. Place and description from H (VII).

1903.22	271°2	9″46	3*n*	Miller	9.0...9.2

7 45 **4982.** **H** 2487. "R. A. very uncertain." This is the same as H 2490 (see No. 4988).

8 8 **4984.** *θ Hydrae.* **H** 2489. (= **H̶** V. 54 = **H̶** VI. 108 = σ 330.) No measures in H̶. The bright star has a large proper motion.

Auwers	0″318 in 159°0
Bossert	0.332 in 158.8
Boss	0.345 in 158.9

The following are all the measures of the distant companion:

1853.76	172°5	62″10	2*n*	OΣ	4.0...10.0
1861.27	172.5	60.04	1*n*	OΣ	
1880.20	175.2	52.69	2*n*	β	...10.5
1881.26	177.1	52.12	1*n*	OΣ	
1902.28	179.7	45.29	4*n*	β	...10.8

The measures of B, 1853–1902 give for the proper motion of A, 0″384 in 153°0.

[β³...OΣ (**X**, p. 82)...β⁶...]

4985. **β** 908. Discovered with the 18½-inch. B is SD(7°) 2762. There is a 12.5 m star in the direction of 222° from A. The later measures are: $8^m\ 25^s$

B and C

1892.21	230°7	0″74	2*n*	β

A and BC

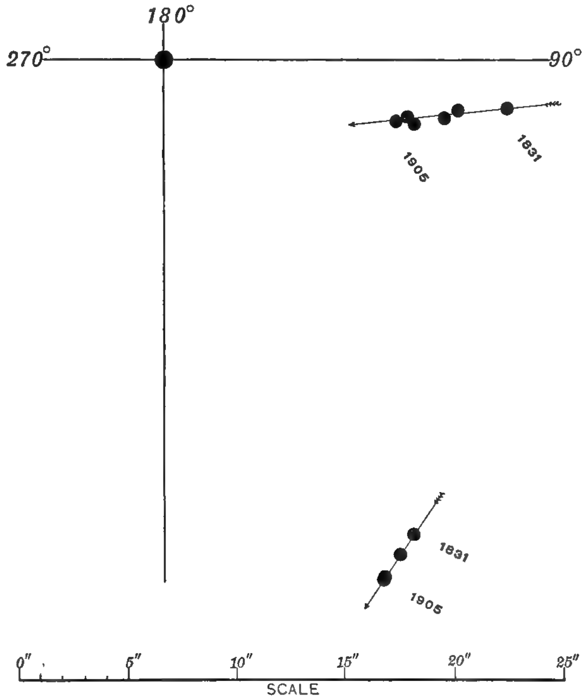
1892.21	184°5	60″58	2*n*	β
1899.11	184.3	60.88	2*n*	β

[β (**XIII**)...β³...β (3141)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

(See p. 1072)

4986. **H** 1165. Distance seemed about 10″ (1877). 8 26

4987. **Σ** 1327. At least two of these stars have a small proper motion, as will be seen from the following positions: 8 26



Σ 1327

A and B

1831.30	81°4	16″13	2*n*	Σ
1866.63	79.8	13.88	5*n*	Δ
1878.13	77.8	13.47	1*n*	β
1893.14	76.1	11.70	2*n*	Gla
1895.28	75.2	12.12	2*n*	HΣ
1905.26	74.7	11.28	2*n*	β

A and C

1831.30	27°.9	25″.07	2*n*	Σ
1866.63	25.8	25.58	5*n*	Δ
1893.14	23.5	26.33	2*n*	Gla
1895.28	23.4	26.21	2*n*	HΣ
1905.26	23.1	26.35	2*n*	β

[H (**VII**) . . . Δ (1474) . . . Δ (**II**) . . . Flm. . . β¹ . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . . β⁶ . . .]

8m 28s **4988.** **H 2490.** This is the same as H 2487 (No. 4982), this place being substantially correct. The other star is DM (13°) 2059.

1880.29	67°.0	21″.73	1*n*	Big

32 **4989.** **A 124.** No other measures.

[A (3741) (*Bul. L. O.* No. 3) . . .]

3 34 **4990.** **β 455.** Discovered with the 6-inch. Change uncertain. Magnitude in Lalande, 7½; DM 8.1.

1888.95	70°.3	1″.93	3*n*	Lv	8.2 . . . 10.2
1898.20	69.5	1.81	3*n*	Doo	8+ . . .

[β (**IX**) . . . β (*Mon. Not.* **XXXVIII**, 78) . . . Hl (I) (2147) . . . Lv¹ . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

9 1 **4993.** **Weisse 21.** Noted "duplex" in W¹. Measures by β³.

9 17 **4994.** **OΣ 198** *rej.* Rejected in *Poulkowa Catalogue* of 1850. "Aucun satellite," Δ (1866.0). In Lalande 8 m. The only measures are:

1879.21	167°.3	16″.12	1*n*	β	8.0 . . . 12.5
1899.19	160.1	15.01	3*n*	Hu	7.5 . . . 12.5

[Δ (I, p. 228) . . . β³ . . . Hu (*Pub. L. O.* **V**) . . .]

9 21 **4995.** **H 2491.** "Neat double star; P est. from diagram." Identified as a pair of equal 11 m stars about 5″ distant (1874).

9 22 **4996.** **Ho 362.** No change.

1905.03	148°.5	4″.62	3*n*	Doo

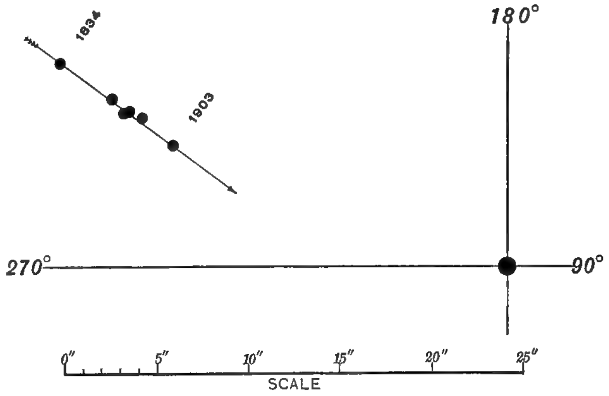
[Ho (3233) . . .]

9 32 **4998.** **Ho 363.** Nothing later but the following:

1905.13	176°.6	2″.09	3*n*	Doo

[Ho (3233) . . .]

9 37 **4999.** **Σ 1329.** Rectilinear motion. The measures cited below give for the most probable annual movement of A, assuming the companion to be stationary, 0″.108 in 216°.0. From meridian observations the proper motion is given 0″.09 in 180° (*A. G. Nico.*). It appears to be a system of the 61 *Cygni* type. The components are DM (−1°) 2164 and 2163.



Σ 1329

1834.26	245°.7	27″.19	4*n*	Σ
1864.75	247.3	23.72	5*n*	Δ
1878.13	248.4	22.84	1*n*	β
1879.21	247.8	22.52	2*n*	Hl
1885.25	248.0	21.85	2*n*	Hl
1903.02	250.3	19.87	3*n*	β

[H (**VII**) . . . Δ (1572) . . . Δ (**II**) . . . En . . . Flm . . . Cin⁵ . . . Wilson (Cin¹⁰) . . . Hl (*Wash. Obsns.* 1885) . . . Hl (**I, II**) . . . β¹ . . . Pt . . . Furner and Storey (*Mon. Not.* **LXIV**, 446) . . . β⁶ . . .]

5001. *Hydrae* **95.** **β 212.** Discovered with the 6-inch. The change, if any, is very slow. Lalande 18296. 10m 11s

1880.50	228°.9	1″.26	4*n*	β
1880.55	223.9	1.51	3*n*	Sp
1888.56	225.4	1.35	3*n*	Lv
1890.20	227.4	1.34	3*n*	T
1900.19	221.3	1.44	3*n*	Doo
1901.29	220.2	1.31	1*n*	A
1903.24	220.2	1.45	1*n*	Biesbroeck

[β (**IV**) . . . β (*Mon. Not.* **XXXIV**, 382) . . . Δ (**I**) . . . β³ . . . Cin⁵ . . . Wilson (Cin¹⁰) . . . LM . . . Lv¹ . . . Sp (**II**) . . . T (3186) . . . A (*Bul. L. O.* No. 11) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . Biesbroeck . . .]

5002. **H 808.** Both stars in *A. G. Leipzig.* 10 23

1880.22	227°.9	21″.56	2*n*	Big	9.0 . . . 9.3
1895.36	225.5	21.52	1*n*	Leip	

[Big . . . *A. G. Leipzig.* p. 248 . . .]

5003. **Σ 1332.** (= **S 594.**) Very little change. The proper motions are given in *A. G. Berlin:* 10 24

A = 0″.102 in 233°.9
B = 0.096 in 238.7

1868.69	19°.4	5″.64	4*n*	Δ
1890.11	20.7	5.72	4*n*	Giacomelli
1893.31	21.7	5.29	2*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Wr. . . Se . . . Se³ . . . Ra (**XXIV**) . . . Δ (1205) . . . Δ (**I, II**) . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III** . . . HΣ (**XII**) . . . Giacomelli (**II**) . . .]

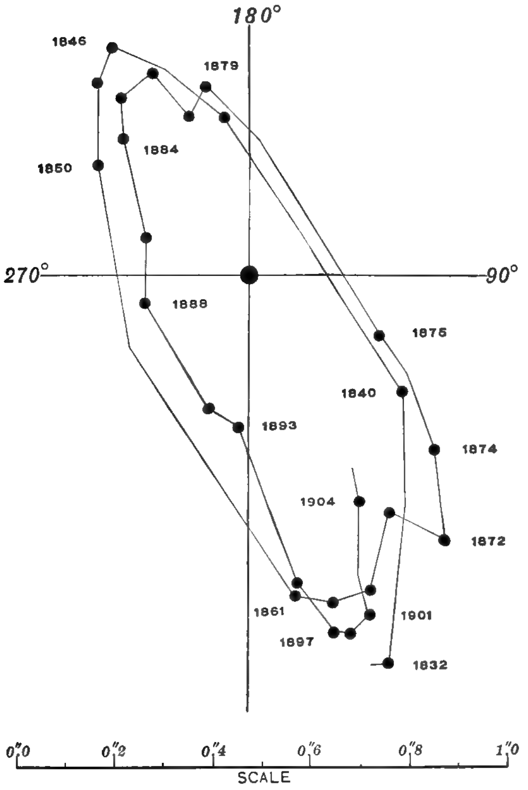
$10^{m}\ 30^{s}$ **5004. β 588.** Discovered with the 18½-inch. No sensible motion. Lalande 18302. In Heis 6–7 m; DM 6.8. These are all the later measures:

1892.05	125°1	2″45	3*n*	β
1886.31	124.1	2.72	2*n*	HΣ
1899.09	129.4	2.43	2*n*	β

[β (X)…β¹…β (3141) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)…HΣ (**XII**)…]

10 46 **5005. Σ 3121.** This binary has made more than two revolutions since the first measures of Struve in 1832. The following orbits have been found:

1864	Fritsche	39.18 yrs.	*Bul. Acad. St. P.* X
1864	Fritsche	40.62	
1877	Doberck	37.03	*A. N.* 2156
1887	Celoria	34.65	*A. N.* 2808
1895	See	34.00	*Evolution of the Stellar Systems*



Σ 3121

The system has a proper motion of 0″507 in 172°4 (Porter). Selected epochs from 1832 to 1904 are shown on the diagram. Some of the recent measures are:

1891.23	345°0	0″29	3*n*	β
1897.32	13.9	0.76	3*n*	A
1903.25	25.5	0.75	3*n*	Biesbroeck
1904.31	26.1	0.53	1*n*	A

[Ma (*F. S.* **I**) … OΣ (**IX**) (**X**, p. 189) … Δ (**II**) … Δ (1736, 1888, 1979, 2081) … En (1674, 2663, 2742, 2786) … Do (2156, 2433) … Do (*Observatory* **II**, 170) … Flm … Sk … Sk² … Sk³ … Sp (**I, II**) … Sp (**II**, App.) … Sp (2133) … Hl (*Wash. Obsns.* 1880, 1883) … Hl (**II**) … Big … Gl … Du … Celoria (2808) … β¹ … β³ … β (3114) … β (*Pub. L. O.* **II**) … Lewis (*Mon. Not.* **LIV**, 315) … Holmes (*Brit. Ast. Ass'n* **V**, 78) … Sp (**III**) … See (*A. J.* 349, 378) … Big (*Bul. Ast.* **XII**, 299) … Sk⁴ … Everett (*Mon. Not.* **LVI**, 464) … Com (*Pub. Washburn Obsy.* **X**) … Doolittle (*A. J.* 416) … Hu (*A. J.* 427) … Morgan (*A. J.* 439) … Doolittle (*Pub. Flower Obsy.* **I**) … Ho (3558) … Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 795) … Maw (**III**) … Glasenapp (**V**) … A (3638) (*A. J.* 429) … Brown (3645) … A (*Bul. L. O.* No. 11) … HΣ (**XII**) … Biesbroeck …]

5006. OΣ (App.) 98. B is DM (7°) 2101. $10^{m}\ 46^{s}$

[⅃ (I)…] (See p. 1072)

5007. H 4193. "Difficult and ill-defined." 10 55

1877.11	118°1	3″12	1*n*	Cin

[Cin⁴…Wilson (Cin¹⁰)…]

5011. Σ 1333. (= **♅ I. 31.**) The motion, if any, is small. 11 2

1782.86	38°6	….	1*n*	♅
1850.13	42.8	1″63	6*n*	OΣ
1866.46	43.0	1.51	3*n*	Δ
1884.18	42.2	1.69	2*n*	Per
1893.16	46.6	1.89	2*n*	Gla
1893.23	46.0	1.68	2*n*	Lewis
1898.24	44.7	1.50	4*n*	Hu

[Ma (*F. S.* **I**, 27, 125, **II**, 217) … Ma (**XI, XIII, XV**) … Se … Se² … Se³ … H (**V, VII**) … H¹ … H² … Wr … En (1673) … Du … Flm … Δ (1205) … Δ (**I, II**) … Do (2989, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13) … Pt … Per … Per (2684) … Je (2449) … Sk³ … Sk⁴ … Big … Glasenapp (**II**) … Lewis (*Mon. Not.* **LIV**, 315) … Maw (**II**) … Knorre (3300) … Ho (3558) … Coleman (*Mem. R. A. S.* **LIII**) … HΣ (**XII**) … Sk⁵ … Biesbroeck …]

5012. H 128. H (V) 283°5 : 15″: 6…16 (1830) "very delicate." 11 21

1879.17	277°8	23″72	1*n*	β³	6.5…13
1902.65	280.2	22.97	3*n*	β⁶	7.0…12.2

The distance given in β³ is one-half a revolution too large. It should be as given here.

5013. Σ 1336 *rej.* The only measures are: 11 22

1905.04	179°8	40″20	2*n*	β⁶

5014. 38 *Lyncis.* **Σ 1334.** (= **♅ I. 9 = Sh 104.**) Probably without relative change, and the proper motion is therefore common to both components. 11 23

Auwers	0″122 in 199°4
Bossert	0.122 in 190.5

1782.40	244°1	….	1*n*	♅
1852.00	240.7	2″70	1*n*	Σ
1866.56	239.1	2.80	3*n*	Δ
1875.32	237.0	2.90	5*n*	Sp
1887.26	235.6	2.96	5*n*	Hl
1889.33	237.3	2.99	3*n*	Maw
1893.16	238.2	2.96	2*n*	Gla
1903.31	235.5	2.88	2*n*	Biesbroeck

[Ma (**X, XI, XIII, XV**) .... Ma (324) .... Ma (*F. S.* **I**, 51, 126, **II**, 209) .... Wr.... H (**V**)...Se...Se3...Ra (**XXIII**)...Ba (**II**)...OΣ (**IX**)...Δ (1026, 1256)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Gl...WS...WS2...Du...Do (2199, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Je (2347)...Pk...Bl (**V**)...Sp (**II**)...Per...Per (2684)...En (2663)...Sk2...Sk5...Maw (**I**)...Seagrave (*Sid. Mess.* **II**, 22)...Hl (**II**)...β3...Lewis (*Mon. Not.* **LIV**, 315)...Glasenapp (**II, III**)...Knorre (3300)...Brown (3645)...Ho (3558)...Boeger (*A. J.* 522)...Biesbroeck...]

11m 24s **5015.** **Σ 1331.** The faint star, D, is given from H (VI); not mentioned by Σ. I found it very difficult with the 6-inch, 1874, C being readily seen. Dembowski measures a very distant 9 m star, not in Σ, 223°3 : 139″97 (1863.11) 1*n*.

There is no material change in the close pair.

A and B

1845.34	154°0	0″92	3*n*	OΣ
1867.22	154.8	0.93	3*n*	Δ
1879.34	153.6	0.88	3*n*	Hl
1889.28	153.3	0.85	3*n*	Hl
1897.36	152.7	0.82	3*n*	Brown

AB and C

1848.25	196°5	11″45	1*n*	OΣ
1867.22	195.1	11.52	3*n*	Δ

The only measure of the Herschel star is:

1904.99	115°6	19″52	1*n*	β

[Ma (*F. S.* **I**, 27, 51)...Ma (**X, XI, XII, XIII, XV**?)...OΣ (**IX**)...Δ (**II**)...Gl...Hl (**I, II**)...Brown (3645)...β6...]

11 29 **5016.** **A 221.** The later measures are:

1902.36	290°1	0″39	1*n*	Lewis
1903.30	304.3	0.44	1*n*	Lewis

[A (3784) (*Bul. L. O.* No. 16)...Lewis (*Mon. Not.* **LXIII**, 403; **LXIV**, 795)...]

11 46 **5017.** **Σ 1326.** (= S 593.) Fixed.

1867.84	171°6	29″19	3*n*	Δ
1905.33	172.9	29.13	1*n*	β

[Ma (*F. S.* **II**).... Ra (**XXVII, XXVIII**).... Δ (1205).... Δ (**I, II**).... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)....β6....]

11 47 **5018.** **Ho 43.** The later measures are:

1900.31	293°4	0″54	2*n*	A
1902.24	300.2	0.48	5*n*	Gr. Obsy.

[Ho (2778, 3558)...A (3638) (*Bul. L. O.* No. 11)...Greenwich Obsy. (*Mon. Not.* **LXIII**, 403; **LXIV**, 795)...]

(See p. 1072)

11 57 **5019.** **Σ 1330** *rej.* Only this since Struve:

1905.18	303°1	25″00	1*n*	β6	8.5...10.0

12 0 **5020.** **Ho 364.** Later measures are:

1903.09	335°8	3″82	3*n*	Doo

[Ho (3233)...]

12 5 **5021.** **H 126.** (= Σ 1337 *rej.*) The magnitude in DM is 8.5.

12m 24s **5023.** 37 *Lyncis.* **OΣ 199.** B. A. C. 3169. In *Ursa Major* according to B. A. C. and Heis. No material change. The proper motion of the large star, which belongs to the companion as well, is given:

Auwers	0″141 in 345°6
Porter	0.153 in 338.7
A. G. Harvard	0.163 in 348.2

Some of the measures are:

1870.30	117°0	5″47	5*n*	Δ
1897.73	120.9	5.71	4*n*	Doo
1898.31	121.3	5.84	3*n*	Hu

[Ma (**XIII**)....OΣ (**IX**)....Δ (**I**)....Seagrave (*Sid. Mess.* **II**, 22)....Engelhardt (**II, III**)...Maw (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Pub. L. O.* **V**)...Do (3930)...]

12 54 **5025.** **S 595.** B is O. Arg. S. 9562. The only measures since 1825 are:

1903.49	283°7	66″61	2*n*	β6

There is an apparent change in distance.

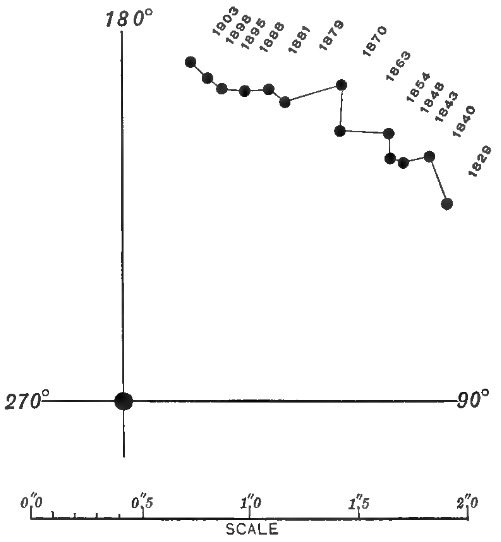
12 56 **5026.** **A 125.** No other measures

[A (3741) (*Bul. L. O.* No. 3)...]

13 18 **5029.** **H 130.** The following is the only later measure:

1903.86	51°5	13″00	2*n*	β6	9.5...12.6

13 29 **5030.** *Lyncis* 157. **Σ 1338.** Probably binary. Slow direct motion, with no sensible change in distance. The mean angular motion is about 0°64 annually.



Σ 1338

1829.53	121°1	1″76	5*n*	Σ
1840.33	128.2	1.82	4*n*	OΣ
1843.30	130.2	1.70	4*n*	Ma
1848.95	131.9	1.68	5*n*	Da
1854.26	134.9	1.74	2*n*	OΣ
1863.28	140.9	1.60	5*n*	Δ

1870.32	146°1	1″78	2*n*	OΣ
1879.22	151.3	1.58	3*n*	Hl
1881.29	154.8	1.59	4*n*	Je
1888.28	158.3	1.54	3*n*	Hl
1895.33	162.1	1.52	3*n*	Com
1898.06	165.2	1.54	3*n*	Hu
1903.33	168.7	1.60	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...H¹...H²...Bp...Da²...Da³...Wr...Se...Se³...Ba (**II, III, IV**)...En (1674, 2663)...Δ (1026, 1111, 1256, 1474, 1735)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...WS...WS²...Gl...Sk...Hd....Bl (**V**)....Bru²....Do (2197, 2199, 3799)(*Trans. R. I. Acad.* **XXIX**, Part 13 ...Du pp. 43, 162)...Flm...Sp (**II**)...Sp (2133)...OΣ (**IX**)...Hl (**I, II**)....Hl (*A. J.* 269)....Glasenapp (**II**)....Lewis (*Mon. Not.* **LIV**, 315)....Je (2449)...Maw (**II**)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (*Pub. Washburn Obsy.* **X**)...Morgan (*A. J.* 439)...Brown (3645)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ(**XII**)...Boeger (*A. J.* 522)...Maw (**IV**)...Biesbroeck...]

(See p. 1072)

13ᵐ 29ˢ **5031.** **A** 126. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

13 31 **5032.** **Σ** 1339. In Ma (*F. S.* I, p. 27) this is called Σ 1329. Late measures are wanting.

1867.40	71°5	1″11	3*n*	Δ

[Ma (**XI**)...Ma (*F. S.* **I**, pp. 27, 66)...Δ (**II**)...]

13 41 **5033.** **Σ** 1343. At one time there appeared to be considerable change in the distance from an erroneous measure by Ferguson in 1863. Later measures show that the components are relatively fixed.

1866.88	271°7	9″73	3*n*	Δ
1880.83	272.8	9.88	3*n*	β
1899.28	272.0	9.73	1*n*	A

[Ma (**XI, XV**)...H (**V**)...Ferguson (*Wash. Obsns.* 1863)...Flm...Pt...En (2663)...Lv¹...Δ (**II**)...Big...Jones (*A. J.* 312)...β³...A (3638)...]

13 55 **5034.** **Σ** 1342. (= **Sh** 369.) ♅ III. 84 is erroneously called Σ 1342; it is obviously Σ 1340. (See No. 5038.) The principal star of Σ 1342 has been measured from 40 *Lyncis*, 35°6 : 207″55 (1881.29) 1*n*, for determining the proper motion of the latter star. Very little if any change in the components of Σ 1342.

1866.01	323°6	17″58	4*n*	OΣ
1869.20	323.7	17.37	4*n*	Δ
1886.30	322.0	17.28	1*n*	Eng

Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...OΣ (**X**, pp. 82, 162)...Engelhardt (**II**)...]

14 10 **5036.** **H** 810. The only observation since Herschel is:

1880.22	33°6	20″40	2*n*	Big

14 30 **5037.** **Σ** 1341. Fixed.

1867.05	267°8	20″84	3*n*	Δ
1901.11	267.4	20.69	3*n*	Espin

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Gl...Espin (*Mon. Not.* **LXII**, 529)...]

5038. 39 *Lyncis.* **Σ** 1340. (= ♅ III. 84 = **S** 596.) (See No. 5034.) Fixed. The principal star has a proper motion of 0″023 in 290°7 (Auwers). In *A. G. Harvard:* 14ᵐ 21ˢ

A = 0″021 in 43°9
B = 0.082 in 0.0

One or the other is incorrect, since the stars are moving together.

1867.08	319°7	6″02	3*n*	Δ
1905.33	319.9	6.15	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Wr...Bl (**V**)...Δ (**II**)...β⁶...]

5039. 27 *Hydrae.* **Sh** 105. (= ♅ IV. 85 = σ 336.) B is SD (9°) 2801. The companion to this was first noted by Doolittle. The following are all the other measures: 14 38

A and B

1898.19	210°6	229″66	3*n*	Doo
1903.90	210.8	229.26	1*n*	β

B and C

1898.17	197°5	9″57	2*n*	Doo	
1903.89	197.0	9.65	2*n*	β	8.3...10.6

[Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

5040. **A** 127. No other measures: 14 43

[A (3741)(*Bul. L. O.* No. 3)...]

5042. **H. C. Wilson** 6. From Wilson (Cin¹⁰). No other measures. 14 52

5043. **Σ** 1335 *rej.* "Another near." From H (VI). 14 55

1905.33	54°7	22″21	1*n*	β	9...10

[H (**VI, VII**)...β⁶...]

5046. **Innes** 198. An earlier measure is: 15 31

1898.30	182°0	0″45	1*n*	See

[Innes (3438)(*Mon. Not.* **LXIV**, 133)...]

5047. **Σ** 1344. Fixed. 15 55

1867.04	106°7	3″60	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

5051. **A. G.** 164. Double in *A. G. Lund.* 16 18

1901.33	17°5	4″75	2*n*	Ku	9.7...9.9

[β⁶...Kustner (3821)...]

5053. **A. G.** 165. Double in *A. G. Berlin.* Measures by Aitken (*Bul. L. O.* No. 11). 16 28

16m 36s **5055.** **OΣ 200.** Dawes calls this a miniature *ε Bootis*. There is no evidence of change. These stars are given a proper motion of 0″055 in 90° (*A. G. Harvard*).

1848.28	338°5	1″56	1*n*	Da
1869.76	338.	1.41	5*n*	Δ
1871.36	338.5	1.54	2*n*	Du
1889.28	337.0	1.48	3*n*	Hl
1898.10	335.8	1.35	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Flm ... Du ... Sk³ ... Bru² ... Hl (**I, II**) ... Da³ ... Da⁴ ... Maw (**I**) ... Knorre (3300) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ... Boeger (*A. J.* 522) ...]

(See p. 1072)

16 51 **5056.** **OΣ 201.** A third star 20″ distant is mentioned in the *Poulkowa Catalogue*, but not measured by OΣ. Ma gives angle only, 305°5 (1843.3) 1*n*. Not seen by Δ in 1863 and 1866. In 1873 I saw it with the 6-inch as 11.8 m, but very difficult. There may be a little change in AB, but it is very slow.

1843.25	236°6	1″24	2*n*	Ma
1870.91	228.0	1.40	5*n*	Δ
1878.79	223.6	1.51	3*n*	Sp
1879.39	228.2	1.29	2*n*	Hl
1885.15	222.7	1.34	4*n*	Per
1888.29	226.7	1.37	3*n*	Hl
1898.10	223.4	1.21	3*n*	Hu

For the small star we have:

1900.31	309°9	30″32	2*n*	Hu

[Ma (*F. S.* **II**, 233) ... Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Hl (**I, II**) ... Sk³ ... Big ... Pt ... Per ... Per (2749) ... En (2678) ... Sp (**II**) ... Turner (*Mon. Not.* **LIV**, 315) .... Maw (**II**) .... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 500; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 795) .... Brown (3645) .... Coleman (*Mem. R. A. S.* **LIII**) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ...]

16 54 **5057.** **β 337.** Discovered with the 6-inch. Unchanged.

1877.13	322°3	8″00	2*n*	Cin
1892.19	326.8	7.83	3*n*	Lv
1898.29	325.5	8.16	1*n*	See

[β (**VI**) .... β (2062) .... Δ (**I**) .... Cin⁴ .... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... See ( ) ...]

17 1 **5058.** **Σ 1347.** (= **S** 597.) Fixed.

1865.53	310°7	21″09	3*n*	Δ

[Ma (*F. S.* **II**) ... H (**V**) ... Se¹ ... Se³ ... En ... Ra (**XXIII**) ... Δ (1205) ... Δ (**I, II**) ... Glasenapp (**III**) ... *Annals Toulouse Obsy.* **III** ...]

17 8 **5059.** **21** *Ursae Majoris.* **Σ 1346.** (= **H II. 73** = **Sh** 370.) Fixed. The proper motion of the principal star is 0″021 in 172°9 (Auwers).

1868.75	311°4	5″63	4*n*	Δ
1901.17	312.6	5.45	2*n*	Espin

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XII, XIII, XV**) ... Wr ... Se ... Se³ ... H (**V**) ... Bl (**V**) ... Ra (**XXII, XXIV**) ... Du ... Gl ... WS² ... Sk² ... Δ (1119) ... Δ (**I, II**) ... Collins (*A. J.* 378) ... Do (3930) ... Espin (*Mon. Not.* **LXIV**, 676) ...]

17 15 **5060.** **Σ 1345.** Fixed.

1867.53	86°9	2″65	3*n*

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**VI**) ... Δ (**II**) ... Gl ...]

17m 15s **5061.** **β 338.** Discovered with the 6-inch. Without change.

1877.12	274°3	7″14	2*n*	Cin
1893.64	276.3	6.97	3*n*	W
1899.09	274.2	6.78	2*n*	β

[β (**VI**) ... β (2062) ... Δ (**I**) ... Cin⁴ ... Jones (*A. J.* 312) ... Wilson ( ) ...]

17 40 **5062.** *κ Leonis.* **β 105.** Discovered with the 6-inch. The measures thus far show no relative change. Auwers gives the proper motion, 0″057 in the direction of 231°7, and it is obvious that the companion has the same motion.

1877.75	208°8	3″22	2*n*	OΣ
1878.33	203.8	2.88	2*n*	Hl
1883.47	205.1	3.36	8*n*	En
1886.23	202.2	3.37	3*n*	HΣ
1889.13	203.9	2.79	3*n*	β
1898.27	205.3	2.96	3*n*	A

[β (**II**) .. β (*Mon. Not.* **XXXIII**, 437) ... β³ ... β (2930) ... β (*Pub. L. O.* **II**) ... Δ (**I**) ... OΣ (*Poulkowa Obsns.* **X**) ... Hl (**I**) ... Pt ... Burton (*Copernicus* **I**, p. 54) ... En (2678) ... A (3584) ... HΣ (**XII**) ... Do (3930) ... Lewis (*Mon. Not.* **LX**, 500; **LXII**, 383) ...]

17 45 **5063.** **H 813.** Error of 1m in the R. A. of H. C fainter than B with 6-inch (1876). The only recent observation is:

AB	1903.78	64°1	21″40	2*n*	β⁶	8.3...11.9
AC	1903.78	101.0	28.75	2*n*	β⁶	...12.0

18 1 **5067.** **OΣ 202** *rej.* From *Poulkowa Catalogue* of 1843. No measures by OΣ; companion not visible to Δ in 1866. Well seen with 6-inch (1875). The only measures are:

1899.16	198°7	17″46	3*n*	Hu	8.5...13.0

[Δ (**I**, p. 228) ... Hu (*Pub. L. O.* **V**) ...]

18 8 **5070.** **β 1070.** This close pair of small stars, discovered with the 36-inch, is 27s *f* and 4′8 *n* of *κ Leonis* (β 105). The magnitude in DM is 8.8. The later measures are:

1898.43	74°6	0″34	1*n*	A
1899.13	82.3	0.45	1*n*	Lewis
1903.31	82.8	0.70	1*n*	Bowyer

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... A (3584) ... Lewis and Bowyer (*Mon. Not.* **LX**, 500; **LXIV**, 794) ...]

18 10 **5071.** *Hydrae* **116.** **Σ 1348.** A physical system, the components having a large common proper motion:

Porter	0″214 in 265°2
Bossert	0.227 in 259.8

There is but little relative motion.

1843.19	330°8	1″35	3*n*	Ma
1846.78	328.2	1.14	2*n*	OΣ
1864.16	326.9	1.57	5*n*	Δ
1866.30	327.5	1.65	2*n*	OΣ
1877.20	323.2	1.71	4*n*	Sp
1881.25	324.5	1.67	4*n*	Je
1885.33	323.4	1.75	3*n*	Hl
1891.29	322.9	1.76	2*n*	HΣ
1897.25	324.4	1.82	1*n*	Brown
1901.74	319.6	1.59	4*n*	Bowyer

[Ma (*F. S.* **I**)....Ma (**XI, XII, XIII, XV**)....Se....Se^3....En (1674)....Hd....Δ (1185, 1474)...Δ (**I, II**)...WS...WS^2...Gl...Sk...OΣ (**IX**)...Sp (2133)...Sp (**II**)...Do (2199, 2307, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Je (2449)...Per...Per (2684)...Lv^1...T (2991)...Hl (**I, II**)...Hl (*Wash. Obsns.* 1885)....Jones (*A. J.* 312)....Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383)....Maw (**II**)....Brown (3645)...*A. G. Leipzig*, p. 248...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk^5...Giacomelli (**II**)...]

18^{m} 24^{s} **5075.** **Hd 123.** Nothing later except:

1883.17	0°0	5″±	1*n*	Wilson	7.5...12.0

[Hd...Wilson (Cin^{10})...]

18 56 **5076.** **Hn 98.** No other measures.

[*Pub. Washburn Obsy.* **II, VI**...]

18 58 **5077.** **A 222.** The only other measure is:

1903.31	324°3	0″34	1*n*	Bowyer

[A (3784) (*Bul. L. O.* No. 16)...Bowyer (*Mon. Not.* **LXIV**, 795)...]

19 7 **5078.** **A 4.** The later measures are:

1902.64	44°6	0″95	3*n*	Gr. Obsy.

[A (3635)...Lewis and Bowyer (*Mon. Not.* **LXII**, 383; **LXIV**, 795)...]

19 8 **5079.** **A 223.** No other measures.

[A (3784) (*Bul. L. O.* 16)...]

19 45 **5082.** Arg. 22. "Duplex, Cl. III" in O. Arg. S. Examined and estimated as given (1875).

20 **5084.** **H. C. Wilson 7.** From Cin^{10}. Place approximate.

20 13 **5085.** **Ho 365.** Later measures show no change.

1905.05	152°6	12″72	3*n*	Doo

[Ho (3233)...]

20 15 **5086.** **β 589.** Discovered with the 18½-inch.

1886.31	213°3	3″10	2*n*	HΣ
1892.06	218.9	3.13	3*n*	β
1901.48	216.3	3.22	4*n*	Doo

[β (**X**)...β^1...β (3141) (*Pub. L. O.* **II**)...HΣ (**XII**)...Doolittle (*A. J.* 547)...]

20 35 **5088.** **A. G. 166.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554).

20 44 **5089.** **Ho 366.** Later measures give:

1899.32	11°9	0″65	3*n*	A
1904.23	16.1	0.52	5*n*	Doo

[Ho (3233)...A (3638)...]

5090. 41 *Lyncis.* **S 598.** (= **♅ IV. 55 = OΣ (App) 99.**) 20^{m} 48^{s}
Another star is given in ♅, and said to have been overlooked by S, 320°8 : 15″87 (1783.17) 1*n*. There is no such companion here, and the observation probably refers to Σ 1342, which is erroneously called ♅ III. 84 in ♅. In 1874 Δ suspected an elongation of the principal star in 148°, but not seen since, and probably not real. The change in the distant companion is due to proper motion. The motion of A is given from meridian observations:

Auwers	0″133 in 187°3
Porter	0.138 in 192.6

If this value is substantially correct, the companion has some motion of its own.

1840.27	162°3	85″33	2*n*	OΣ	6.0...7.8
1868.34	162.0	82.76	1*n*	OΣ	
1876.10	161.8	82.47	3*n*	Δ	5.7...7.5
1878.35	161.9	82.12	2*n*	OΣ	
1880.37	161.8	81.64	1*n*	β	
1886.49	161.7	81.50	4*n*	Franz	
1903.11	161.5	79.84	3*n*	β	

The above seven sets of measures, upon the hypothesis that B is fixed in space, give as the most probable value of the motion of A:

0″0873 in 178°3

The early meridian positions give for the relation of A and B:

1790.3	160°5	90″25	Lalande
1843.1	163.5	85.73	O. Arg. N.

[Δ (**I**)...OΣ (**X**)...Bl (**V**)...β^3...Engelhardt (**II**)...Franz (3080)...β^6...]

5091. **A 128.** No other measures. 20 49

[A (3741) (*Bul. L. O.* No. 3)...]

5092. **A 129.** No other measures. 20 55

[A (3741) (*Bul. L. O.* No. 3)...]

5093. **Σ 1349.** Without change. 20 58

1867.52	164°5	19″19	3*n*	Δ

[Hl^1....Ma (*F. S.* **I**)....Ma (**XI**)....Ra (**XXIV**)....Δ (1205)....Δ (**I, II**)....Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...]

5094. **Σ 1355.** Very little, if any, change in either angle or distance. Porter (3452) gives for the proper motion of the mean, 0″235 in 230°5. 20 59

1843.19	328°9	2″79	3*n*	Ma
1852.63	326.3	2.67	2*n*	Da
1867.13	330.3	2.58	3*n*	Δ
1878.78	331.2	2.73	4*n*	Hl
1887.26	333.4	2.60	2*n*	Hl
1893.29	333.8	2.30	3*n*	Lewis

[Ma (*F. S.* **I**)....Ma (**XI**)....Bp....Da^2....Da^3....Da^4....Se....Se^2....Wr...Ra (**XXIV, XXXVIII**)...Ba (**II**)...Bru...Δ (1205)...Δ (**I, II**)...Bru^2...Pl. .Sp (**II**)...Hl (*Wash. Obsns.* 1878)...Hl (**I, II**)...Per...Per (2684)...Lv^1....Jones (*A. J.* 312)...Glasenapp (**II, III**)...Lewis (*Mon. Not.* **LIV**, 315)....Maw (**II**)....Brown (3645)....*A. G. Leipzig*, p. 248....*Annals Toulouse Obsy.* **III**....]

21^m 3^s **5095.** Σ 1353. Unchanged.

1867.93	314°3	3″13	4*n*	Δ
1896.19	313.2	3.19	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^3...Δ (**II**)...Glasenapp (**IV**)...]

21 22 **5097.** 29 *Hydrae.* β 590. Discovered with the 18½-inch. Relatively fixed. The principal star has a proper motion of 0″068 in the direction of 268°3 (Auwers), which seems to belong to the companion, as otherwise its angle should have diminished 8° in the interval covered by the measures.

1891.27	176°0	10″95	2*n*	β
1899.00	174.7	10.52	2*n*	β
1901.06	173.6	10.83	3*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Cin^5...]

21 33 **5100.** **Innes ——.** (See No. 5130.)

21 41 **5101.** *α Hydrae.* H VI. 111. The large star has a proper motion of 0″059 in 331°5 (Auwers). The only measure since H is:

1879.25	152°8	281″27	1*n*	β^3	...9.0

The companion is SD (8°) 2681. Examined with the 40-inch in 1904, and nothing nearer seen worth noting.

21 50 **5102.** **A. G. 167.** "Duplex?" in *A. G. Berlin.* Not double, 1903, Miller (*A. J.* 546).

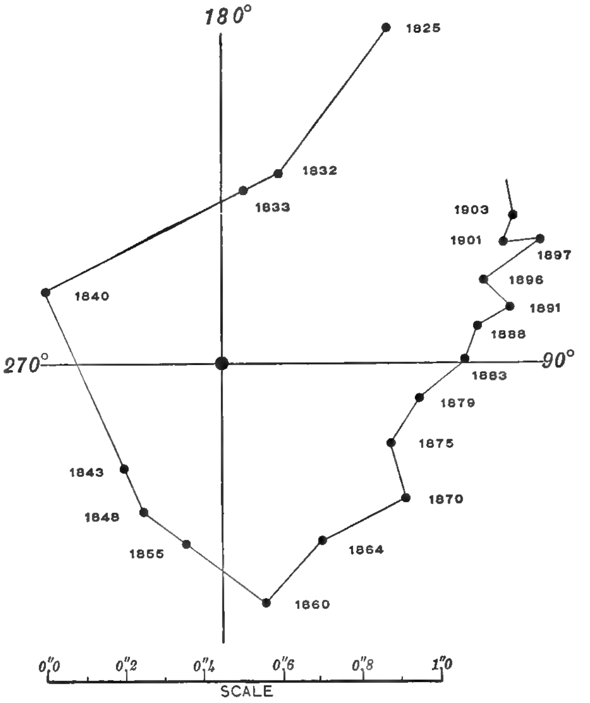
22 2 **5103.** *ω Leonis.* Σ 1356. (= H I. 26 = S 600.) The following orbits have been found for this well-known binary:

1842	Madler	82.53 yrs.	*Dorpat Obsns.* IX, p. 198
1847	Madler	117.58	*F. S.* I, p. 249
1855	Klinkerfues	96.78	*Inaugural Diss.*
1855	Klinkerfues	133.35	*A. N.* 990
1855	Klinkerfues	227.77	*A. N.* 1127
1867	Klinkerfues	142.41	*Theoretische Astronomie*
1872	Doberck	114.55	*Observatory* II, p. 172
1875	Doberck	110.82	*Trans. R. I. Acad.* XXVI
1875	Doberck	107.62	*A. N.* 2078
1891	Hall	115.30	*A. J.* 269
1895	See	116.20	*Stellar Systems*

The early measures are uncertain, and the period cannot be certainly known until the companion has nearly returned to the position of 1832. This system has a proper motion of 0″040 in 63°1 (Auwers).

The following positions at short intervals of time will be sufficient to show the extent of the relative motion.

1840.29	247°5	0″49	2*n*	OΣ
1843.30	316.8	0.37	2*n*	OΣ
1848.32	332.1	0.43	4*n*	OΣ
1855.32	348.7	0.47	2*n*	OΣ
1860.28	10.2	0.62	2*n*	OΣ
1864.30	29.2	0.52	1*n*	OΣ
1870.28	53.6	0.58	2*n*	OΣ
1875.25	64.6	0.46	5*n*	Δ
1879.78	79.8	0.51	4*n*	β
1883.34	90.9	0.62	3*n*	Hl
1888.28	98.3	0.66	5*n*	Hl
1891.28	101.1	0.75	5*n*	Hl
1896.28	107.2	0.69	4*n*	Com
1897.47	111.0	0.88	7*n*	Hu
1901.09	113.1	0.79	6*n*	Doo
1903.22	116.7	0.84	4*n*	Biesbroeck



ω Leonis. Σ1356

[Ma (*F. S.* **I**, 249)....Ma (**IX, X, XI, XIII, XV**)....Ma (324, 430, 452)....Σ^1.... OΣ (**IX**)...OΣ (**X**, p. 163)...Da^1...Da^3...Bp...H^1...H (**VII**)...Klinkerfues (*Theoretische Astronomie*)(*Über eine neue Methode die Bohnen der Doppelsterne*, Inaugural Dissertation; Göttingen, 1855)....Klinkerfues (990, 1127)....J^3....Se....Se^2....Se^3....Se (1017, 1072, 1614)....Se (*Comp. Rend.* **XLVIII**, 375)...Hd...WS...Gl...Du...WS^2...Do (2078, 2095, 2197, 2242, 2433, 2989, 3930)(*Trans. R. I. Acad.* **XXIX**, Part 13)(*Trans. R. I. Acad.* **XXVI**)(*Observatory*, **II**, 172)....Δ (1979, 2079, 2193)....Δ (**II**)....Bru^2.... Sp (2133)...Sp (**I, II**)...Sp (**II**, App.)...Flm...Pl...Sk...Sk^2...Sk^3...Sk^4 ...Sk^5...β^1...β^3...Je (2449)...Hl (*Wash. Obsns.* 1880, 1881, 1882, 1883, 1884, 1892)(*A. J.* 269)...Hl (**I, II**)...Perry (*Ast. Reg.* **XIX**, 176)...Wn (**V**) Wn (1738)...Per...Per (2684)...En (1674, 2663, 2742, 2786)...Lv^1...Com (**VI, X**)....T (2991)....Collins (*A. J.* 278)....*Proc. Haverford Coll. Obsy.* 1891, 1892...Glasenapp (**II, V**)...Sp (**III**)...Maw (**II, IV**)...Big...Big (*Bul. Ast.* **XII**, 299)...Barnard (*A. J.* 447)...Everett (*Mon. Not.* **LVI**, 464)...See (3311, 3314)(*A. J.* 349)...See (*Evolution of the Stellar Systems*)...Hu (*A. J.* 397, 427)....A (3584)(*A. J.* 429)....Doolittle (*A. J.* 416, 547)(*Pub. Flower Obsy.* **I**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 362; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 795)...Brown (3645)...Knorre (3518)....Ho (3558)....Solá (3563)....Coleman (*Mem. R. A. S.* **LIII**).... Gl (*Mon. Not.* **LXI**, 556)....HΣ (**XII**)....Thiele (3837)....Biesbroeck....]

(See p. 1072)

22^m 3^s **5104.** 23 *Ursae Majoris.* **Σ** 1351. (= **H** IV. 29 = **Sh** 371.) Fixed. H (VI) speaks of a 12 m star 80″ distant, which has been measured by Engelhardt. The large star has a proper motion:

Auwers	0″.104 in 75°.5
Bossert	0.117 in 75.2

The companion has the same movement.

1867.88	271°.4	22″.78	4*n*	Δ
1886.38	270.2	22.57	2*n*	Eng
1900.44	270.5	22.99	1*n*	Hu

[Ma (*F. S.* **II**)....Ma (**X, XIII, XV**)....OΣ (**IX**)....Bl (**V**)....Pk....Δ (**II**).... T (2898)....Engelhardt (**II, III**)....]

22 6 **5105.** 3 *Leonis.* **H** IV. 47. (= σ 343.) The principal star has a proper motion of 0″.064 in 271°.8 (Auwers). These are all the measures:

1852.19	81°.6	25″.71	2*n*	Lassell	
1879.48	79.2	25.14	3*n*	β	6...10.7
1901.23	79.7	24.87	2*n*	β	

[Lassell (*Mon. Not.* **XIII**, 183)...β1...β3...β5...]

22 25 **5106.** **β** 213. Discovered with the 6-inch. Unchanged. This pair is 34½′ *n* of α *Hydrae.*

1880.17	179°.3	1″.40	2*n*	β	
1892.09	179.5	1.62	3*n*	β	8.0...9.4
1902.91	176.3	1.59	7*n*	Doo	

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β3...β (3141) (*Pub. L. O.* **II**)...Δ (**I**)... Cin5...]

22 29 **5107.** **Σ** 1357. Fixed.

1868.23	54°.4	7″.25	4*n*	Δ
1880.74	53.6	7.35	2*n*	β

\[Ma (*F. S.* **I**) ... Se ... Se3 ... WS ... Gl ... WS2 ... Δ (**II**) ... β3 ... Cin5 ... Wilson (Cin10)...]

23 1: **5109.** **H** 1167. There is nothing in this place. The Decl. in H is 1° too small, making the star identical with τ *Hydrae.* (See No. 5110.)

23 3 **5110.** τ *Hydrae.* **Sh** 106. (= **H** VI. 71 = **H** 1167 = σ 344.) The proper motions of these stars are given:

A = 0″.118 in 91°.9 Auwers
0.135 in 90.0 Bossert
B = 0.180 in 90.0 *A. G. Nico.*
0.195 in 90.0 Bossert

The relative change, if any, is small. This will appear from the meridian positions, and the recent measures:

1800	1°.4	66″.12		Lalande
1887.3	3.0	65.32		*A. G. Nico.*
1901.25	3.5	65.30	2*n*	β

The proper motion is evidently the same for both stars.

[Ra (**XXIII, XXXIX**)...β5...]

5111. **Σ** 1358. H gives colors, *yellow : blue.* Probably unchanged. 23^m 9^s

1868.19	156°.8	23″.75	4*n*	Δ
1881.24	158.5	23.89	1*n*	Big

[H (**IV**)...Ma (*F. S.* **II**)...Δ (**II**)...Flm...Big...]

5112. **Σ** 1361 *rej.* (= **H** 137.) From H (V). 23 32

(See p. 1072)

5113. 7 *Leonis Minoris.* **H** 1166. (= **H** V. 69 = **OΣ** (App) 100.) The principal star has a proper motion of 0″.057 in 206°.0 (Auwers). 23 28

1783.10	.....	58″.30	1*n*	H	
1876.02	130°.0	62.80	3*n*	Δ	6.0...9.3
1886.22	129.5	62.31	4*n*	Fr	5.8...8.6

[Δ (**I**)...Franz (3080)...]

(See p. 1072)

5114. **β** 591. Discovered with the 18½-inch. Probably without change. 23 33

1878.21	31°.9	0″.73	1*n*	Δ
1884.03	39.8	0.67	5*n*	En
1890.26	31.8	0.66	4*n*	Sp
1892.08	35.4	0.72	3*n*	β
1892.57	34.8	0.74	6*n*	Sp
1901.28	30.9	0.69	2*n*	A

[β (**X**)....β1....β (3141) (*Pub. L. O.* **II**)....Δ (**I**)....T (2866)....En (2742).... Sp (**III**)....A (*Bul. L. O.* No. 11)....]

5115. **A** 130. No other measures. 23 46

[A (3741) (*Bul. L. O.* No. 3)...]

5116. **Σ** 1360. (= **H** 138.) The meridian observations give different proper motions to the components. 24 10

A = 0″.222 in 262°.4 Bossert
0.228 in 261.7 Glasgow 2d
B = 0.246 in 243.5 Bossert
0.251 in 243.8 Glasgow 2d

The motion is the same for each star, as there has been no relative change.

1865.84	243°.0	14″.25	3*n*	Δ
1896.19	242.8	14.41	1*n*	Gla

[Ma (*F. S.* **I**)...H1...H2...Ma (**XI**)...Se...Se3...Ra (**XXIV**)... Δ (1185)... Δ (**I, II**).... Glasenapp (**IV**) .... *A. G. Leipzig*, p. 208 .... *Annals Toulouse Obsy.* **III**....]

5117. **A. G.** 168. Double in *A. G. Lund.* Measures by β6. 24 12

5120. **Σ** 1350. (= **OΣ** 203 *rej.*) No change in either star. 24 20

A and B

1866.14	67°.0	10″.51	4*n*	Δ
1899.50	66.5	10.51	3*n*	Hu

B and C

1866.49	210°8	121″61	2*n*	Δ

[H (**V**)... H^1... Ma (*F. S.* **I**) ... Ma (**XI**) ... Ra (**XXIV**) ... Ba (**I**) ... OΣ (**IX**) (**X**, pp. 163, 204).... Δ (1205).... Δ (**I, II**).... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Hl (*Wash. Obsns.* 1880) ... Hl (**I**, p. 26) ... En (2662)... Cin^5... Hu (*Pub. L. O.* **V**)...]

24^{m} 21^{s} **5121.** **Σ 1359.** Probably unchanged.

1868.12	66°4	7″55	3*n*	Δ

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Seagrave (*Sid. Mess.* **II**, 274)...]

24 35 **5122.** **See 113.** Discovered at the Lowell Observatory (*A. J.* 431).

24 49 **5123.** *θ Ursae Majoris.* **β 1071.** Very minute companion discovered with the 36-inch. It was obvious from the measures made with that instrument, in connection with the large proper motion of the principal star, that the two constituted a physical system. Auwers (*Fundamental Catalogue*) gives this proper motion, 1″101 in the direction of 240°2. The measures to this time show no sensible relative motion. The following are all the later measures:

1890.38	79°1	4″87	3*n*	β
1892.05	75.3	5.15	3*n*	β
1898.27	76.4	5.22	1*n*	β
1898.34	87.1	5.00	1*n*	Lewis
1898.49	78.4	5.06	2*n*	A
1899.34	87.1	5.00	1*n*	Lewis

θ Ursae is a spectroscopic binary, discovered by Belopolsky (*A. N.* 3549, 3603).

[β (**XV**)... β (2929, 3048, 3141) (*Pub. L. O.* **II**)... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 500)... A (3584)...]

24 59 **5124.** **Σ 1364.** (= **H** 466.) C from H; not in Σ. AB apparently fixed; the distance in Σ appears to be too small.

1848.24	155°7	16″72	1*n*	Ma
1864.73	154.0	16.36	5*n*	Δ
1881.30	155.9	16.39	2*n*	Sp
1903.28	155.5	16.42	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**V**)... Flm... Δ (**II**)... Sp (**II**)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Biesbroeck...]

25 **5125.** **A 224.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

25 17 **5126.** **β 339.** Discovered with the 6-inch. No sensible change.

1878.53	215°1	1″32	1*n*	Cin
1888.23	219.3	1.31	1*n*	Lv
1898.31	218.0	1.35	1*n*	See
1901.07	220.5	1.48	4*n*	Doo

[β (**VI**)... β (2062)... Cin^5... Wilson (Cin^{10})... Δ (**I**)... Lv^1... See (   )...]

5127. *Hydrae* 134. **Σ 1365.** Probably without change, but some of the measures are not accordant. 25^{m} 20^{s}

1866.05	159°2	3″16	3*n*	Δ
1875.37	159.0	3.22	4*n*	Sp
1880.71	158.9	3.40	2*n*	β
1890.12	160.1	3.21	3*n*	Giacomelli
1903.26	159.1	3.34	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII**)... Hd... H (**VI**)... Da^3... Se.... Se^2... Se^3... Bru^2 (p. 72, 81)... Ra (**XXIII, XXX, XXXIX**)... Bru... Δ (1185)... Gl... Sk^3... Sp (2133)... Sp (**II**)... Δ (1185)... Δ (**II**)... β^3... Hayn (3051)... Brown (3645).... Doolittle (*Pub. Flower Obsy.* **I**).... *Annals Toulouse Obsy.* **III**.... Do (3930)... Giacomelli (**II**)... Biesbroeck...]

5129. **β 909.** Discovered with the 18½-inch. The later measures are: 25 25

1892.17	91°1	5″94	3*n*	β
1901.25	89.6	6.28	3*n*	Doo

[β (**XIII**)... β^3... β (3141) (*Pub. L. O.* **II**)... Doolittle (*A. J.* 547)...]

5130. **Jacob 5.** From J^3; discovered during an occultation by the moon. This appears to be wrongly identified in Part I as Lacaille 3873; it should be Lacaille 3833, which is about 5^{m} preceding. It is identical with the pair credited to Innes (see No. 5100). The components appear to be fixed. 25 26

1878.53	235°5	0″58	1*n*	Cin	
1880.22	239.0	0.62	1*n*	Cin	
1889.24	244.8	1.05	3*n*	β	6.3...7.1
1897.85	245.4	0.42	1*n*	See	

[J^3... Cin^5... Cin^6... β (2930) (*Pub. L. O.* **II**)... See (3496)...]

5131. 6 (*h*) *Leonis.* **Sh 107.** (= **♅ V. 26** = σ 346 = **OΣ (App) 101.**) The large star has a proper motion of 0″011 in 320°7 (Auwers). The distance of the companion is slowly increasing. 25 32

1781.14	77°1	34″06	1*n*	♅	
1782.27	....	36.15	1*n*	♅	
1840.21	74.5	36.80	2*n*	OΣ	
1874.78	74.3	37.36	2*n*	OΣ	6.0...9.0
1875.47	74.5	36.99	3*n*	Δ	5.0...9.5
1904.26	74.3	37.12	2*n*	β	

[Se^1... Ra (**XXIII**)... Cooper (2155)... Δ (**I**)... OΣ (**X**, p. 20)... Solá (3523)... β^6...]

5133. **Σ 1363.** Unchanged. 26 11

1867.53	354°4	10″66	3*n*	Δ

[Ma (**XI**)... Ma (*F. S.* **I**)... Δ (**II**)...] (See p. 1072)

5134. *Leonis* 29. **♅ N. 29** (= **Ho 367.**) Lalande 18742. Change from proper motion. 26 17

1840.19	256°6	34″94	1*n*	OΣ	
1881.26	256.6	32.88	1*n*	OΣ	5.0...10.0
1893.28	255.6	32.46	2*n*	Ho	6.2...11.0
1903.80	258.1	32.28	2*n*	β	7.1...10.9

[OΣ (**X**, p. 20)... Ho (3233)... β^6...] (See p. 1072)

$26^m\ 21^s$ **5135.** **Σ 1367.** Fixed.

1868.26	182°8	5″43	4*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Se...Se^3...Δ (**II**)...Cin^5,...]

26 29 **5136.** **Σ 1362.** (= **S 601.**) No motion.

1869.39	133°7	4″92	4*n*	Δ

[Ma (*F. S.* I)... Ma (**X**)... *Gr. Obsns.* 1840... H (**V**)... Wr... Ra (**XXIV**)...Ba (**II, III**)...Δ (1205)... Δ (**I, II**)... Do (2989)(*Trans. R I. Acad.* **XXIX**, Part 13)...Seagrave (*Sid. Mess.* **II**, 274)...Gl...]

27 . **5140.** **Perry.** Noted by Perry (*Eng. Mech.* XXXV, 260). I looked for this at the time of measuring No. 5149, but could not find it.

27 10 **5141.** **β 910.** Discovered with the 18½-inch. Probably fixed.

1882.15	304°7	6″96	1*n*	Wilson
1892.06	305.9	6.68	3*n*	β
1893.22	305.0	6.33	2*n*	Jones
1901.76	306.2	6.84	4*n*	Doo

[β (**XIII**)...β^3...β (3141) (*Pub. L. O.* **II**)...Wilson (Cin^{10})...Jones (*A. J.* 312)...]

27 24 **5142.** **Σ 1366.** Fixed. The principal star is given a proper motion of 0″040 in 270° (*A. G. Harvard*).

1867.12	323°7	7″86	3*n*	Δ

[Ma (**XI**)...Ma (*F. S.* I)...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 529)...]
(See p. 1072)

27 46 **5144.** **Σ 1368.** Probably unchanged.

1867.12	219°8	21″65	3*n*	Δ
1902.21	220.4	21.12	2*n*	Espin

[Ma (*F. S.* **II**)...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 529)...]

27 53 **5145.** **Σ 1369.** (= **H IV. 30 = S 603.**) Fixed.

1864.47	147°4	24″66	3*n*	Δ

South observed a distant star not in Σ:

1824.25	325°4	118″61	2*n*	S	
1863.99	325.1	118.22	1*n*	Δ	...7.5

[Ma (*F. S.* **II**)...Ra (**XXVII**)... Δ (1205)... Δ (**I, II**)...*Annals Toulouse Obsy.* **III**...]

27 57 **5146.** **A 131.** A faint star, 320°: 10″. No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

28 36 **5149.** **OΣ (App) 102.** This appears to be L 18825, with an error of 5′ Decl. in Lalande. The companion is DM (14°) 2114. The only other measures are:

1902.70	42°3	49″07	3*n*	β

[Δ (**I**)...β^6...]

5151. **Σ 1370.** Without change. $28^m\ 57^s$

1868.74	95°1	17″42	4*n*	Δ
1904.67	94.9	17.60	2*n*	β

[Ma (**XI**)...Ma (*F. S.* I)...Δ (**II**)...β^6...]

5152. **Σ 1371.** "Small star *dusky red*, a very remarkable color," H (V). Bossert gives the principal star a proper motion of 0″111 in the direction of 214°4. If this is correct, it would imply a physical system, as there has been no relative change in the stars. 29 10

1867.17	279°4	7″24	3*n*	Δ
1893.19	277.0	7.06	2*n*	Gla
1903.88	278.5	7.68	2*n*	β

[Ma (*F. S.* I)... Ma (**XI**)...H (**V**)...Δ (**II**)...Glasenapp (**II**)...β^6...]

5153. **H 817.** The only later position is: 29 17

1900.27	194°3	12″41	1*n*	Hu	10.0...10.5

[Hu (*Bul. L. O.* No. 44)...]

5154. 7 *Leonis.* **H V. 58.** (= **Sh 108 = σ 350.**) Relatively fixed. The proper motion of the large star is 0″045 in 264°9 (Auwers), and this must be the movement of the companion, which is DM (15°) 2078. 29 19

1821.23	80°6	44″20	1*n*	Sh	6½...8½
1840.21	79.9	41.19	2*n*	OΣ	6.7...9.5
1876.26	80.3	41.15	2*n*	Δ	6.2...8.5
1877.29	79.7	41.32	8*n*	Hl	
1882.61	80.0	41.13	4*n*	En	
1904.25	79.7	41.02	2*n*	β	

[Se^1...Ra (**XXIII**)...OΣ (**X**, p. 20)...Δ (**I**, p. 412)...En (2662)...Hl (**I**)...β^6...]

5156. **S 604.** Nothing since South but the following: 29 59

1901.71	90°5	51″32	2*n*	β^5	7.1...8.7

5158. **Σ 1372.** The measures are very inconsistent for so easy a pair, and change is very doubtful. The components have a proper motion of 0″062 in 243°4 (*A. G. Berlin*). 30 31

1847.90	57°3	0″72	5*n*	OΣ
1856.25	46.8	0.58	2*n*	Se
1870.70	53.8	0.62	6*n*	Δ
1875.38	51.5	0.65	4*n*	Sp
1883.52	60.7	0.88	7*n*	En
1884.18	54.3	0.76	2*n*	Per
1902.38	57.[illegible]	0.60	3*n*	A

[Ma (*F. S.* I) ... Ma (**IX, X, XI**) ... H (**VIII**) ... Se ... Se^3 ... Se (*Comp. Rend.* **XLVIII**, 375)...Sp (**II**)...Δ (**II**)...Per...Per (2684) ...En (2663)...OΣ (**IX**) ...Ho (3234)...]

5159. **Hu 723.** The mean of this and later measures is: 30 31

1903.99	182°7	1″97	3*n*	Hu	8.5...10.0

[Hu (*Bul. L. O.* No. 65)...]

30m 32s **5160.** **H 468.** The R. A. in H (V) is 25s less, which agrees with the place of the 9.5 m star, DM (19°) 2234.

30 32 **5161.** **Ho 368.** The preceding star of three.

1903.09	109°7	0″95	3*n*	Doo

[Ho (3233)...]

30 52 **5163.** **H 4224.** "Fine." Double in *Cordoba Zones.*

1876.15	116°6	7″33	1*n*	Cin
1903.34	117.1	7.01	2*n*	Scott

[Cin3...Do (3799)...Scott (*Mon. Not.* **LXIV**, 52)...]

32 19 **5164.** **OΣ 204.** Unchanged.

1867.37	102°9	8″29	3*n*	Δ
1898.42	101.8	8.52	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Per...Per (2749)...Hu (*Pub. L. O.* **V**)...]

32 32 **5165.** **Hu 724.** With a later measure the mean is:

1903.55	206°1	2″09	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

33 18 **5168.** **Σ 1373.** Fixed.

1867.94	128°5	1″80	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

33 56 **5171.** *Leonis Minoris* 30. **Σ 1374.** (= **Ḫ I. 32.**) Probably binary, but the motion is very slow. The components appear to have a common proper motion of 0″180 in 153°3 (*Greenwich 10-Year Catalogue*). The principal star is Groombridge 1569.

1783.00	261°5	....	1*n*	Ḫ
1852.28	275.0	3″35	10*n*	Wr
1866.46	280.9	3.37	3*n*	Δ
1872.81	284.1	3.11	7*n*	Du
1877.27	279.9	3.40	4*n*	Sp
1884.18	282.6	3.24	2*n*	Per
1893.31	284.8	3.13	2*n*	Gla
1903.23	287.3	3.23	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...H1...Wr...Flm...Bl (**V**)...Du...Δ (2194)...Δ (**II**)...Sk...Sp (**II**)...Per...Per (2684)...En (2663)...Big...Glasenapp (**II**)...Lewis (*Mon. Not.* **LIV**, 315; **LXII**, 383; **LXIV**, 796)...Maw (**I**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**)...Knorre (3632)...Boeger (*A. J.* 522)...Sk5...Do (3930)...Biesbroeck...]

34 21 **5173.** **O. Stone 19.** From Wilson (Cin10).

1904.03	266°4	2″58	2*n*	β6	8.6...10.1

There is a 13 m star, 295°: 25″.

34 40 **5174.** **Σ 1375.** No motion.

1867.95	304°6	6″90	4*n*	Δ
1904.04	305.7	7.02	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β6...]

5175. *o, 14 Leonis.* **Ḫ VI. 76.** (= **Sh 109** = σ **351.**) 34m 45s

Change from proper motion of A:

Auwers 0″159 in 262°4

These are all the measures:

1783.08	40°4	63″48	1*n*	Ḫ	
1823.27	36.4	70.83	1*n*	Sh	4 ...15
1881.47	41.4	80.89	4*n*	β	5.5... 9.3
1888.30	41.6	82.00	2*n*	Eng	
1903.97	42.8	83.27	3*n*	β	... 9.7

The large star is a spectroscopic binary, discovered by Campbell (*Astrophysical Jour.* VIII, 292).

[β3...Engelhardt (**II**)...β6...]

5176. **Hu 629.** No other measures. 34 52

[Hu (*Bul. L. O.* No. 57)...]

5177. **OΣ 205.** Not measurable by Dembowski in 1866. 35 0

In 1875 I found the companion about 11.8 m with the 6-inch. The measures in Ma (XIII) are erroneous, or belong to some other pair. The following are all the later measures:

1879.23	199°3	11″87	2*n*	Hl
1889.25	200.3	12.03	2*n*	Hl
1898.21	200.3	12.08	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**, p. 228)...Hl (**I, II**)...Hu (*Pub. L. O.* **V**)...]

5178. **OΣ 206** *rej.* Rejected in *Poulkowa Catalogue* of 35 41

1850. The following are all the other measures:

1846.30	233°6	16″46	1*n*	Ma
1852.26	235.0	16.41	1*n*	Ma
1879.20	232.8	17.43	1*n*	β
1899.01	232.1	17.46	3*n*	Hu

[Ma (**XI, XIII**)...Δ (**I**)...β3...Hu (*Pub. L. O.* **V**)...]

5180. **Ḫ N. 20.** The place in Ḫ is erroneous; identified 35 48

and estimated, 290°: 40″: 6...11 (1875). In Heis 5 m.

1904.00	292°3	54″67	2*n*	β6	6.5...9.9

No other measures. There is a faint star about the same distance on the following side.

5181. **β 214.** Discovered with the 6-inch. The motion, 35 52

if any, is slow.

1886.29	261°3	3″21	1*n*	LM
1898.25	256.5	3.21	3*n*	A
1902.64	256.5	3.18	7*n*	Doo

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (**I**)...Cin4...LM...A (3584)...]

5186. **Σ 3122.** (= **H 820.**) No change. 37 3

1867.77	253°2	12″53	3*n*	Δ
1902.97	253.1	12.91	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...β6...]

37^m 14^s **5187.** **Σ 1377.** Later observers make the distance larger. In 1871–72 Dembowski thought A was elongated, but later it was seen single.

1867.84	140°4	3″58	3*n*	Δ
1881.21	140.3	3.75	2*n*	β
1887.29	139.1	3.79	3*n*	Hl

[Ma (*F. S.* **II**)...Ma (**XI**)...H (**IV**)...OΣ (**IX**)...Hd...Flm...Sk...WS...Gl...Hl (**I, II**)...β^3...Lv^1...Δ (**II**)...Se...Se^3...Lewis (*Mon. Not.* **LVI**, 359)...Sk^5...]

37 26 **5188.** **Σ 1376.** Perhaps a little change in the angle.

1868.41	313°3	4″98	4*n*	Δ
1897.33	312.0	5.30	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Wr...Du...Δ (1205)...Δ (**I, II**)...Ra (**XXIV**)...Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**...]

37 35 **5189.** **A. G. 169.** Only two 9.5m stars about 2′ apart (1903.80) β^6.

37 49 **5191.** **H 469.** "Small star the *minimum visibile*, but hazy." H (V) 237°4 : 20″± : 7...17 (1830+). The large star is given a proper motion of 0″067 in 186°0 (*A. G. Berlin*).

1898.15	250°9	30″70	3*n*	Doo	
1904.00	253.3	30.37	3*n*	β	7.0...13.0

[Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

38 3 **5192.** **H 470.** The only measures are:

1880.22	211°0	22″72	2*n*	Big	
1903.98	202.65	22.65	2*n*	β^6	9.3...9.3

38 54 **5195.** *Leonis* **61.** **Σ 1379.** Apparently fixed.

1866.52	171°9	9″35	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

39 36 **5197.** **Hu 630.** Discovered at the Lick Observatory (*Bul. L. O.* No. 57).

39 45 **5198.** **H 1170.** Magnitudes in H (V), 12 = 12; in H (VI), 11 = 11. H (V) 137°2 : 6″± (1830+).

[H (**IV, V, VI**)...]

39 45 **5200.** **Σ 1378.** Fixed.

1867.94	359°3	5″10	3*n*

[Ma (*F. S.* **I**)...H (**VI**)...Ma (**XIII**)...Δ (**II**)...]

39 58 **5201.** **H 142.** H (VIII) 125°5 : 15″ : 9...11 (1834+). The magnitude in DM is 9.0.

5204. **See 116.** Later measures are: 40^m 50^s

1898.98	203°0	2″41	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

5207. **Ho 253.** So far without change. 41 21

1899.36	289°8	1″22	2*n*	A	7.0...11.5
1905.13	292.3	1.17	3*n*	Doo	

[Ho (2977)...A (3638)...]

5209. **H 4244.** "Very neat star. P by diagram." 41 43

5210. *Leonis Minoris* 39. **Σ 1382** *rej.* From H (V). He speaks of two other companions 14 m, all forming an ellipse. The only measures are: 41 54

AB	1903.97	108°3	27″97	2*n*	β^6	6.8...10.8
AC	1903.97	256.7	32.92	2*n*	β^6	...11.5

5211. **Kr 33.** Noted as double in *A. G. Hels.* 42 22

1898.35	217°2	1″91	3*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5212. *υ Ursae Majoris.* **OΣ 521.** Probably a physical pair, since the components have a common proper motion: 42 27

Auwers	0″338	in 243°1
Newcomb	0.332	in 241.5
Bossert	0.332	in 243.1

The following are all the other measures:

1877.32	297°3	11″25	1*n*	OΣ	...12.5
1889.18	294.5	11.23	3*n*	β	...12.5
1892.13	295.5	11.37	3*n*	β	...12.8
1898.29	295.4	11.39	3*n*	Hu	

[OΣ (**IX**)...OΣ (**X**, p. 198)...Δ (**I**, p. 230)...Sadler (*Ast. Reg.* **XXIII**, 117)...β (2930, 3141) (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...]

5213. **Hn 99.** The only later measure is: 42 28

1898.3	212°8	2″09	1*n*	See

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

5214. **Σ 1381.** Probably unchanged. 42 30

1842.66	216°1	1″51	1*n*	Ma
1866.80	214.3	1.50	3*n*	Δ

[H (**VI**)...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

5215. **Σ 1383** *rej.* If this is the 9.1m star, DM (32°) 1940, the R. A. should be about 1^m more. (See p. 1072) 42 35

5216. **H 2508.** Not in DM. 42 43

1904.09	305°6	14″14	1*n*	β^6	10.2...11.0

42m 45s **5217.** **H 1172.** "Elegant star." Error of −5′ Decl. in H. The larger star about 8m (1875).

1904.10	273°0	13″85	2*n*	β⁶	8.3...11.1

43 17 **5219.** **OΣ 207** *rej.* The distance appears to be increasing.

1878.28	323°2	19″24	1*n*	β
1898.23	321.5	20.25	3*n*	Hu
1898.42	322.4	19.89	5*n*	Doo

[Ma (**XI, XIII**) ... Δ (**I**) ... β1 ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

43 19 **5220.** **Innes 205.** The only measure is:

1898.3	22°0	2″04	1*n*	See

[Innes (3438) (*Southern Double Stars*, p. 312) ...]

43 22 **5221.** **Σ 1384.** Fixed.

1868.73	181°6	11″86	4*n*	Δ

[Ma (**X, XI**) ... Ma (*F. S.* **I**) ... Δ (**II**) .. *Annals Toulouse Obsy.* **III** ...]

(See p. 1072)

43 23 **5222.** **Σ 1385.** It is probable that the angle in Σ is too large, and that there has been no sensible change.

1863.95	350°2	1″12	4*n*	Δ
1878.21	350.5	1.14	1*n*	β
1895.28	344.7	1.20	2*n*	HΣ
1903.25	353.4	1.18	2*n*	Lewis

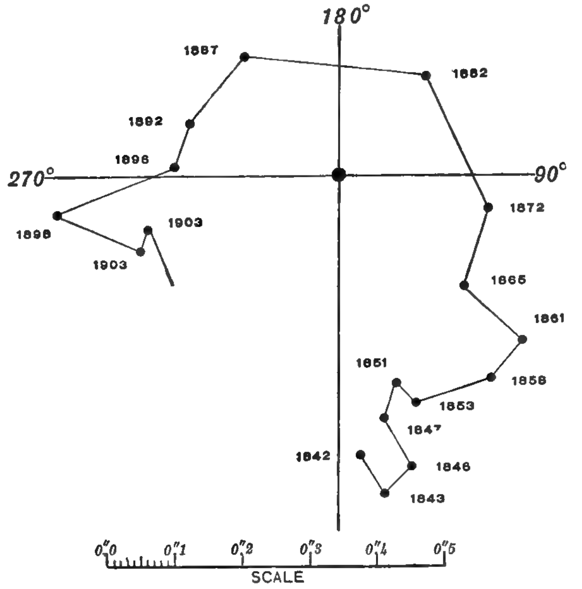
[Ma (*F. S.* **I**) ... Ma (**X, XI, XIII**) ... Δ (1474) ... Δ (**II**) ... Flm ... Pt ... Sk ... Sk² ... β1 ... Lewis (*Mon. Not.* **LX**, 501; **LXII**, 383; **LXIV**, 796) ... HΣ (**XII**) ...]

43 56 **5223.** *φ Ursae Majoris.* **OΣ 208.** Binary system, with a proper motion of 0″025 in 358°0 (Auwers). The following orbits have been found:

1875	Casey	115.4 years	*A. N.* 2417
1892	Glasenapp	91.92	*A. N.* 3119
1895	See	97.0	*Evolution of Stellar Systems*
1902	Doberck	97.70	*A. N.* 3912

It is evident from inspection that the orbit is still doubtful from the uncertainty of the path of the companion in the fourth quadrant.

1842.30	4°2	0″42	1*n*	Ma
1843.11	8.0	0.48	4*n*	OΣ
1846.01	13.8	0.45	3*n*	Ma
1847.65	10.5	0.37	4*n*	OΣ
1851.25	14.9	0.32	7*n*	OΣ
1853.64	18.3	0.36	4*n*	OΣ
1858.80	36.7	0.38	5*n*	OΣ
1861.74	47.9	0.37	3*n*	OΣ
1865.42	48.3	0.25	2*n*	OΣ
1872.42	77.6	0.23	2*n*	OΣ
1882.19	139.0	0.2±	4*n*	En
1887.43	218.9	0.23	4*n*	Sp
1892.13	250.8	0.24	3*n*	β
1896.92	267.2	0.25	2*n*	A
1898.18	277°7	0″43	3*n*	Hu
1899.31	286.6	0.39	3*n*	Brown
1903.32	290.3	0.32	4*n*	Biesbroeck
1903.38	285.6	0.30	2*n*	A
1905.35	294.3	0.32	2*n*	A



φ Ursae Majoris. OΣ 208

[Ma (*F. S.* **I**, 214) .... Ma (**X**, p. 60, **XI, XIII**) .... OΣ (**IX**) .... OΣ (**X**, p. 194) .... Da³ ... Se ... Du ... Flm ... En (1674, 2678) ... WS ... Sk ... Big ... Δ (**I**, p. 228) ... Casey (2417, 2434) ... β (3141) (*Pub. L. O.* **II**) ... Big (*Bul. Ast.* **XII**, 299) ... Glasenapp (3119) (**IV**) ... Sk⁴ ... Everett (*Mon. Not.* **LVI**, 464) ... Com (*Pub. Washburn Obsy.* **X**) ... See (*A. J.* 359, 378) ... See (*Evolution of the Stellar Systems*) ... A (3465) ... Hu (*A. J.* 427) ... HΣ (**XII**) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) .... Brown (3645) .... Hu (*Pub. L. O.* **V**) .... Doolittle (*Pub. Flower Obsy.* **I**) .... Do (3912) ... Biesbroeck ...]

(See p. 1072)

5224. **Ho 369.** The later measures indicate change in angle. 43m 57s

1903.65	110°3	0″30	3*n*	Doo

[Ho (3233) ...]

(See p. 1072)

5225. **OΣ (App) 103.** B is W² IX. 906. No change. 44 13

1891.21	123°9	78″16	4*n*	Franz

[Δ (**II**) ... Franz (3464) ...]

5226. **Σ 1380.** Fixed. 44 26

1868.74	28°7	1″83	4*n*	Δ
1881.37	28.0	1.78	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**X**) ... Δ (**II**) ... β⁴ ...]

5227. **OΣ 522.** (= **H 3316.**) In 1870 Dembowski could not see the companion. I found it plain with the 6-inch, 1874. H, 115°3 : 15′± : 7-8 ... 11-12 (1831+). 44 39

1898.22	123°0	14″57	3*n*	Hu

[H (**VI**) ... OΣ (**IX**) ... Δ (**I**, p. 230) ... Hu (*Pub. L. O.* **V**) ...]

$45^m 11^s$ **5229.** **Σ 1387.** Fixed.

1867.84	271°0	8″87	3*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)..Kn...Δ (**II**)...]

45 12 **5230.** **Σ 1386.** In the field with Σ 1387. Dembowski measures the principal stars of these pairs, 355°4 : 144″41 (1868.83) 2*n*. No material change in this pair.

1869.15	114°2	1″89	4*n*	Δ
1891.18	115.0	1.83	2*n*	Hl

[Ma (*F. S.* **I**) ... Ma (**X, XIII, XV**)... H (**V**) ... OΣ (**IX**)... Flm ... Δ (1205) ... Δ (**I, II**)... Sk ... Hl (**I, II**) ... Kn ... Brown (3645) ... Boeger (*A. J.* 522) ... Sk^6...]

45 22 **5232.** **OΣ 209.** Fixed.

1868.38	306°5	4″80	4*n*	Δ
1898.22	307.4	4.73	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

45 32 **5233.** **Σ 1389.** Slow motion in angle.

1865.16	317°4	1″99	4*n*	Δ
1878.78	315.0	1.99	4*n*	Sp
1883.48	313.4	2.21	7*n*	En
1886.28	313.4	2.21	2*n*	Hl
1893.21	312.0	2.20	5*n*	HΣ
1895.38	311.6	2.31	2*n*	Collins
1897.30	311.8	2.25	2*n*	Brown
1898.26	311.4	2.29	4*n*	Hu
1903.39	311.7	2.13	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^3...Sk...Pt...Δ (1474)...Δ (**II**)...Sp (**II**)....En (2663)....Hl (**I, II**)....Hl (*Wash. Obsns.* 1886)....Gore (*Mon. Not.* **XLVII**, 62)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Big...Jones (*A. J.* 312)...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIV**, 796)....Collins (*A. J.* 378)....Brown (3645)....HΣ (**XII**)...Sk^5...Biesbroeck...]

45 34 **5234.** **Σ 1390.** C was added by Se. No change in AB.

1867.17	209°5	2″30	3*n*	Δ
1891.32	205.4	1.81	3*n*	Ho
1904.56	209.0	2.18	2*n*	β

The following are all the later measures of the Secchi star:

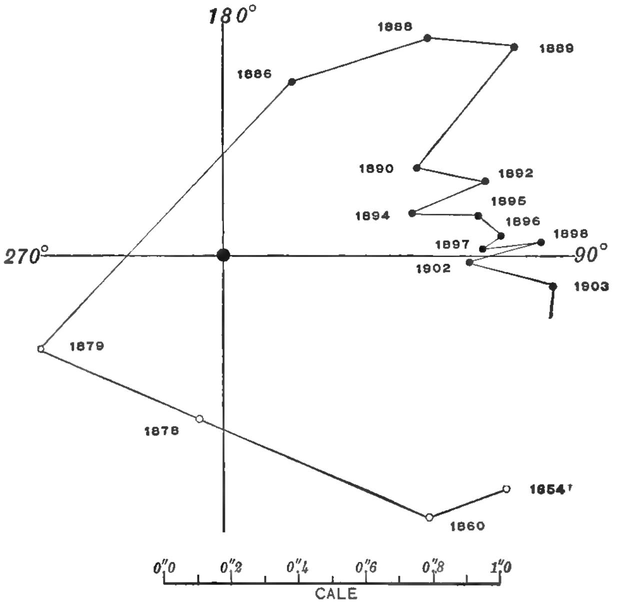
1891.32	40°4	10″85	3*n*	Ho
1904.56	41.0	11.12	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se^3...Δ (**II**)...Ho (3234)...β^6...

46 34 **5235.** 8 *Sextantis.* **A. C.** 5. (AC = **H** **N.** 49 = **H** 4256.) The close pair was discovered by Alvan Clark in 1852 with a 4¾-inch refractor. These stars form an interesting physical system. Glasenapp, from the measures to 1892, finds a period of 93.92 years. The observations as a whole are more or less inconsistent in angle as well as distance, and it is evident that measures of considerably more than one revolution will be needed to give even good approximate elements of the orbit.

The following are most of the principal measures to this time.

1860.30	38°2	0″5	1*n*	Da	
1873.26	173.8	Cun	2*n*	Δ	
1875.30	169.0	Elong.	4*n*	Δ	
1876.07	157.7	0.44?	1*n*	Δ	
1878.22	117.4	0.2±	2*n*	Cin	
1878.26	172.0	0.25±	1*n*	β	
1879.20	180±	....	1*n*	β	"doubtful"
1879.23	297.5	0.31	1*n*	Hl	"uncertain"
1886.27	158.5	0.28	1*n*	Hl	
1888.12	132.9	0.4±	1*n*	Lv	
1888.26	136.7	0.45	4*n*	T	
1889.17	125.6	0.54	3*n*	β	
1889.27	123.3	0.47	2*n*	T	
1890.27	114.1	0.32	4*n*	β	
1891.17	113.1	0.32	4*n*	β	
1892.17	105.3	0.41	4*n*	β	
1894.25	102.2	0.29	1*n*	Com	
1895.31	98.6	0.39	3*n*	Com	
1896.26	96.1	0.37	2*n*	Com	
1896.88	93.6	0.42	3*n*	A	
1897.93	91.0	0.39	3*n*	A	
1898.91	92.2	0.48	3*n*	A	
1900.28	83.1	0.30	2*n*	Bryant	
1902.33	88.1	0.37	1*n*	A	
1903.04	84.4	0.50	2*n*	A	
1903.17	85.5	0.41	2*n*	Bryant	
1903.75	85.7	0.50	6*n*	Biesbroeck	



8 Sextantis

The system has a proper motion of 0″078 in 249°7 (Auwers).

The following are all the measures of the Herschel companion.

1880.28	325°3	35″86	1*n*	β
1905.24	326.8	35.45	1*n*	β

[Da^3...Da^4...Δ (2086)...Δ (I)...Flm...Hd...Lv^1...Cin^5...Wilson (Cin^{10})...Sk...Sk^2...Sk^3...Sk^4...Sk^5...Hl (*Wash. Obsns.* 1886)...Hl (I, **II**)...T (2991, 3186)...Glasenapp (3119) orbit.. β^1...β^3...β^4...β^6...β (2930, 2979, 3048, 3114, 3141)....β (*Pub. L. O.* **II**)....Big (*Bul. Ast.* **XII**, 299)....Everett (*Mon. Not.* **LVI**, 464)...Com (*Pub. Washburn Obsy.* **X**)...A (3465, 3584)...Greenwich Obsy. (*Mon. Not.* **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403)....Brown (3645)...Biesbroeck...]

46^{m} 54^{s} **5238.** **Howe 24.** From Wilson (Cin^{10}). No other measures.

47 50 **5239.** 9 *Sextantis.* **S 605.** (= σ 352.) No evidence of change. The principal star has a proper motion of 0″.074 in 293°.0 (Auwers).

1841.23	292°.2	52″.16	1*n*	OΣ	6.6...8.8
1868.29	291.1	52.00	1*n*	OΣ	
1881.25	290.7	52.07	3*n*	Doubiago	

[Ra (**XXIII**)...Se^1...OΣ (**X**)...]

48 3 **5241.** **Σ 1391** *rej.* The only measures are:

1903.02	316°.3	13″.98	2*n*	Hu

48 38 **5242.** **H 4262.** Nothing later but this:

1904.27	104°.2	7″.68	2*n*	β^6	8.7...10.3

The following connects it with a 6.8 m *sf:*

A and L 19419

1904.26	129°.2	129″.31	1*n*	β^6

48 41 **5244.** **β 215.** Discovered with the 6-inch. There is no evidence of motion.

1884.21	345°.2	1″.88	2*n*	W
1894.21	345.0	1.90	2*n*	W
1898.25	339.7	1.97	3*n*	A
1900.16	344.7	2.10	2*n*	Doo

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Cin^4...Wilson (Cin^{10})...Sellors (3240)...Wilson (   )...A (3584)...]

48 59 **5248.** **Σ 1395.** (= **H** 145.) Fixed.

1866.81	227°.8	18″.73	3*n*	Δ
1905.18	229.0	18.72	1*n*	β

[Ma (*F. S.* **I**)...H (**VII**)...Ma (**XI**)...Δ (**II**)..β^6...]

49 8 **5249.** **Σ 1392.** No late measures, but probably no motion.

1869.02	176°.1	9″.11	4*n*	Δ

Ma(*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

(See p. 1072)

49 13 **5250.** **A. G. 170.** Measures from *A. G. Leipzig*, p. 248.

49 16 **5251.** **β 592.** Discovered with the 18½-inch. Fixed.

1898.28	193°.0	9″.95	1*n*	See
1899.96	189.5	9.79	6*n*	Doo

[β (**X**)...β^1...β^3...Cin^5...Wilson (Cin^{10})...See (   )...Doolittle (*Pub. Flower Obsy.* **I**)...]

5252. **Kr 34.** Noted "double" in *A. G. Hels.* 49^{m} 21^{s}

1898.37	62°.5	36″.15	3*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5254. **Σ 1394.** No material change. 49 39

1867.43	241°.7	3″.86	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...Wr...Δ (**II**)...]

5255. **Σ 1397.** Probably no motion, but late measures are wanting. 49 56

1867.61	113°.8	1″.04	3*n*	Δ

[Ma (*F. S.* **I**)....Ma (**XI**)...Δ (**II**)...]

5256. **Σ 1396.** Fixed. 49 57

1868.24	130°.6	3″.82	4*n*	Δ
1905.18	130.0	3.50	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^3...Δ (**II**)...β^6...]

5258. **A. G. 171.** "Duplex?" in *A. G. Berlin.* "Probably elongated," 1902, Miller (*A. J.* 546). 50 15

5259. **Σ 1399.** (= **S 606.**) Fixed, but common proper motion of 0″.244 in 278°.0 (Porter). 50 26

1866.99	174°.7	30″.38	4*n*	Δ
1889.29	174.4	30.29	3*n*	Giacomelli

[Ma (*F. S.* **II**)...H^1...H^2...H (**II**)...Da^3...OΣ (**IX**)...Ra (**XXIII**)...Lassell (858) (*Mon. Not.* **XIII**, 183)...Hunt (*Observatory.* **III**, 605)...Δ (1205)...Δ (I, II)...Giacomelli (**II**)...Je (2347)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

5263. **β 216.** Discovered with the 6-inch. Probably fixed. 51 20

1894.23	164°.2	2″.97	1*n*	W	7.0...11.5
1898.16	162.2	4.00	1*n*	See	
1899.02	160.2	3.37	1*n*	β	6.5...10.0
1901.13	163.8	3.82	3*n*	Doo	

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Cin^4...Cin^5...Wilson (   )...See (   )...β (*Pub. Y. O.* **I**)...]

5265. **Arg. 23.** "Duplex" in *O. Arg. S.* Measures from Cin^4. The measure credited to this star in Wilson (Cin^{10}), 302°.2 : 35″.37 : 8.0...8.5 (1883.18) 1*n*, evidently belongs to some other pair. Wilson measures another wide pair 8′ *s*, 83°.5 : 57″.53 : 7.0...9.5 (1883.16) 1*n*. 51 30

5268. **Σ 1398.** The measures are not accordant in angle. The principal star is given a proper motion of 0″.070 in 227°.0 (Schroeter). 51 52

1852.67	221°.7	3″.52	1*n*	Ma
1868.87	216.7	2.70	5*n*	Δ
1898.33	223.7	2.60	5*n*	Doo

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Flm ... Δ (2194) ... Δ (**II**) ... Doolittle (*Pub. Flower Obsy.* **I**)...]

52m 14s **5269.** **H V. 63.** B is DM (11°) 2134. The only observation since 1783 is:

1904.29	356°.8	50".78	2*n*	β^6	7.5...9.2

52 20 **5270.** **H 147.** Noted double, distance 35", in Schjellerup. H (VII) gives a third star C, 13m, from B, 305° ±: 15" ±; same R. A., but Decl. −5° 0′. I found the double in the original place as given here (1875), but C not seen, and nothing in −5°.

53 18 **5272.** **Σ 1400.** Distance increasing?

1868.76	225°.7	2".11	4*n*	Δ
1879.35	226.6	2.49	2*n*	Hl
1905.29	225.4	2.51	1*n*	β

[Ma (*F. S.* I)...Δ (II)...Hl (I)...β^6...]

53 46 **5273.** **H 825.** H (VIII) 313°.8 : 12" ± : 9...11 (1836.2) 1*n*.

53 56 **5276.** **Σ 1401.** Fixed. The larger star is given a proper motion of 0".188 in 288°.5 (Bossert).

1867.44	21°.4	23".83	3*n*	Δ
1881.55	22.0	23.73	3*n*	β

[Ma (*F. S.* I)...Ma (XI)...Cin^5...Δ (II)...β^3...*A. G. Leipzig*, p. 248...]

54 17 **5279.** **Hu 725.** With a later measure the mean is:

1903.87	181°.5	0".31	2*n*	Hu	9.0...10.5

[Hu (*Bul. L. O.* No. 65)...]

54 46: **5280.** **H 149.** The place is substantially that of the 8.5m star, DM (5°) 2269.

55 4 **5281.** **OΣ 210.** No material change.

1868.24	266°.9	0".80	2*n*	Δ
1898.10	264.7	1.04	3*n*	Hu

[Ma (*F. S.* **II**, 234)... Ma (**XI, XIII**)... OΣ (**IX**)... Δ (I)... Du... Flm...Sk^3... Big...Hu (*Pub. L. O.* **V**)...]

55 4 **5282.** **H 2515.** "Quadruple, B, C, and D = 15m." The large star has a proper motion of 0".045 in 131°.1 (*A. G. Harvard*). (See p. 1072)

56 2 **5285.** **H 472.** H (VI) 121°.0 : 7" ± (1831+); C not mentioned.

56m 27s **5289.** **H 4277.** Both stars in Yarnall.

1886.17	32°.3	21".49	1*n*	Wilson	8.0...8.0

[Wilson (Cin^{10})...]

56 32 **5290.** **Σ 1403.** Change doubtful.

1856.28	332°.9	2".86	1*n*	Se
1869.18	334.6	2.99	4*n*	Δ
1879.34	334.2	2.61	2*n*	Cin
1901.34	332.9	3.08	2*n*	Kustner

[Ma (*F. S.* I)...Ma (XI)...Se...Se^3...Δ (II)...Cin^5...Kustner (3821)...]

56 44 **5291.** **H 2517.** The proper motion of this star is 0".202 in the direction of 229°.1 (Porter). The only position since Herschel is:

1902.95	154°.0	44".54	2*n*	β^6	7.2...12.0

56 50 **5292.** **Σ 1402.** The distance is increasing from proper motion.

1831.68	96°.0	21".09	3*n*	Σ
1864.45	98.5	23.09	5*n*	Δ
1900.12	100.6	24.90	2*n*	Espin
1902.91	100.7	25.56	3*n*	β

These measures give for the most probable movement of A, 0".065 in 112°.7.

[Ma (*F. S.* **II**)...H^1...Ra (**XXIV**)... Flm... Δ (1185, 1474)... Δ (I, II)... Espin (*Mon. Not.* **LXII**, 529)...β^6...]

56 59 **5295.** **Hu 631.** Discovered at the Lick Observatory.

[Hu (*Bul. L. O.* No. 57)...]

58 10 **5301.** **Ho 370.** No other measures.

[Ho (3233)...] (See p. 1072)

58 11 **5302.** **Σ 1404.** Fixed.

1866.92	294°.0	6".24	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...Se...Hd...WS...Gl... Δ (II)... *Annals Toulouse Obsy.* **III**...]

58 20 **5303.** **β 1072.** (AC = **Sh** 110 = σ 355 = H N. 25.) The faint companion to the principal star of H N. 25 was added with the 36-inch. A and C appear to be fixed. They are Cord. G. C. 13722 and 13721.

A and B

1898.34	43°.5	11".16	1*n*	See
1899.04	43.9	10.94	2*n*	β
1900.11	44.4	10.85	2*n*	A
1901.14	44.3	11.09	4*n*	Doo

A and C (= Sh 110)

1889.13	273°.2	21".23	3*n*	β	6.9...7.1
1898.34	273.0	21.45	1*n*	See	
1899.04	273.8	20.84	2*n*	β	7.0...7.2

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...See (   )...A (*Bul. L. O.* No. 11)...Scott (*Mon. Not.* **LXIV**, 52)...]

58m 42s **5304. Σ 1406.** (= **OΣ 211** *rej.*) The evidence of change is not very satisfactory, but the components have a common proper motion of 0″042 in 278°1 (Battermann).

1845.60	236°0	1″21	3*n*	OΣ
1857.30	224.6	1.15	2*n*	Se
1867.18	228.8	1.08	3*n*	Δ
1878.27	226.5	1.11	4*n*	Sp
1884.18	227.0	1.12	2*n*	Per
1893.30	225.7	1.19	2*n*	Lewis
1899.08	231.0	1.05	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) as OΣ 211 ... OΣ (**IX**) ... Se ... Δ (**II**) ... Sk^3 ... Per ... Per (2684) ... Sp (**II**) ... Lewis (*Mon. Not.* **LIV**, 315) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ...]

58 43 **5305. Σ 1405** *rej.* The only measures are:

1904.55	250°1	21″90	2*n*	β^6	7.0...10.2

58 52 **5307. Innes 292.** Measures by Aitken.

1902.40	210°4	0″66	1*n*	Innes

[Innes (3501)(*Mon. Not.* **LXIII**, 76) .... *Annals Cape Good Hope* **II**, Part IV .... A (3638) ....]

59 7 **5309. Weisse 22.** "Duplex 10″" in W^2. The only measures are:

1904.12	296°7	10″17	2*n*	β^6	8.8...9.1

59 45 **5313. Innes 293.** Measures by Aitken.

1902.40	327°5	0″54	1*n*	Innes

[Innes (3501)(*Mon. Not.* **LXIII**, 76) ... A (3638) ...]

0 11 **5315. Σ 1407.** No material change.

1867.92	50°8	4″72	3*n*	Δ

Ma (*F. S.* **I, II**) ... Δ (**II**) ...]

0 23 **5318. Ho 371.** The only later observation is:

1899.29	43°2	5″93	1*n*	A	6.5...11.5

[Ho (3233) ... A (3638) ...]

0 48 **5319. Hd 125.** The only measures are:

1880.70	171°8	1″94	2*n*	β^3	9.0...9.0
1888.21	171.5	2.01	3*n*	Lv^1	8.8...9.0

0 56 **5320. S 607.** (= σ **356.**) Magnitudes 8...8 in H, and 8-9 in *O. Arg. S.*

1879.25	145°7	9″15	3*n*	Cin	8.5...9.7
1902.12	326.3	8.45	2*n*	Do	

[H (**VIII**) ... WJ ... Cin^5 ... Do (3799) ...]

1 0 **5321. H. C. Wilson 8.** This may be identical with No. 5307.

[Wilson (Cin^{10}) ...]

1m 0s **5322. Σ 1408.** Unchanged.

1867.84	11°2	3″39	3*n*	Δ

[Ma (*F. S.* **I**) .... H (**V**) .... Δ (**II**) .... Do (2989)(*Trans. R. I. Acad.* **XXIX.** Part 13) ...]

1 17 **5325. β 217.** (= **Hd 126.**) Discovered with the 6-inch. It had been previously seen by the Harvard observers, but not published until long after β (IV).

1868.17	276°0	1″66	1*n*	Hd
1882.18	274.6	2.03	2*n*	Wilson
1893.32	279.7	1.75	2*n*	Sellors
1902.99	284.1	2.05	6*n*	Doo
1903.34	279.	1.95	2*n*	Scott

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Cin^3 ... Cin^5 ... Cin^6 ... Wilson (Cin^{10}) ... Hd ... Sellors (3240) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

1 21 **5326. H 475.** "Verified with high powers." In Heis 6-7 m. The only measures are:

1903.11	171°1	27″66	2*n*	β^6	8.0...13

1 21 **5327. Weisse 23.** "Duplex" in Weisse. Measures from *A. G. Leipzig*, p. 248. (See p. 1072)

1 32 **5328.** 31 *Leonis.* **G. Anderson 5.** Discovered by Geo. Anderson with the Washington 26-inch in 1876. The large star has a proper motion of 0″127 in 252°6 (Auwers), and the companion is evidently moving with it.

1878.24	44°2	7″63	2*n*	β	5...13.5
1903.19	41.9	7.64	3*n*	β	

[Hl (**I**) ... β^1 ... β (*Mon. Not.* **LXIII**, 419) ... β^6 ...]

1 41 **5329. β 218.** Discovered with the 6-inch. The measures show no motion. This is the *p* star of a small equilateral triangle.

1880.27	117°9	0″96	1*n*	β
1888.11	120.1	0.91	2*n*	Lv
1892.14	124.4	0.91	3*n*	β
1898.26	122.7	0.92	1*n*	See
1903.00	122.2	0.96	6*n*	Doo

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... β^3 ... β (3142)(*Pub. L. O.* **II**) ... Δ (**I**) ... Cin^4 ... Cin^5 ... Lv^1 ... See (   ) ...]

2 0 **5331.** *a Leonis* (*Regulus*). **Σ 6, App. II.** (= **H VI.** 11 = **Sh 111**; BC = **Hd 127.**) The distant companion to *Regulus* was first observed by Herschel I. in 1779. The measures of the last fifty years show that this companion has the same proper motion as *Regulus*, which has a motion in space of 0″261 annually in the direction of 273°1. Since the measures of Struve the large star has shifted its place nearly 14″. The following measures are sufficient to show the relative fixity of the two stars:

1781.84	305°1	168″33	1*n*	H
1821.21	307.3	174.90	2*n*	Sh
1836.24	306.6	176.90	5*n*	Σ
1863.18	306.8	176.06	3*n*	En
1864.50	306.7	176.99	10*n*	OΣ
1864.78	306.6	176.89	5*n*	Δ
1891.34	306.8	176.73	4*n*	β

Winlock, at the Harvard College Observatory, found that the old companion had a very minute attendant, which had escaped all previous observers. The following are all the measures to this time:

1877.75	86°4	3″48	5*n*	Hl
1878.14	88.5	3.29	4*n*	β
1880.15	87.7	3.03	1*n*	β
1890.27	85.7	3.05	3*n*	β
1891.34	88.2	3.05	3*n*	β
1903.32	81.8	2.25	1*n*	Lewis
1905.09	83.6	2.66	2*n*	β

There may be a little change in the distance.

[En...Se^{3}...Hd...WS^{2}... Do (2200)... Pk...Hl (2147)...Hl (**I**)...Δ (1574)... Δ (**II**)....Sadler (*Eng. Mech.* **XXXIX**, May 23, 1884)....Ingall (*Eng. Mech.* **XLV**, 173)... Elkin (*Report Yale Coll. Obsy.*) parallax... OΣ (**X**)...β^{1}...β^{3} ....β (2979, 3048, 3114) (*Pub. L. O.* **II**) (*Mon. Not.* **LI**, 460).... Lewis (*Mon. Not.* **LXIV**, 796)...β^{6}...]

2^{m} 41^{s} **5334.** **β 911.** Discovered with the 18½-inch. The principal star has a large proper motion:

Radcliffe	0″364 in 195°8
Porter	0.365 in 207.2

With the data given by Porter's value, and the measures of A and C in 1880, the position of C, if fixed, should be for 1898.25, 77°0 : 51″26, which is practically identical with the measures made at Mt. Hamilton at the last-named date. The observations of AB show, beyond question, that the small star is moving in space at the same rate as A.

A and B

1892.10	313°4	4″77	3*n*	β	7.3...10.7
1898.25	310.0	4.84	3*n*	A	
1899.13	314.0	4.49	1*n*	β	

A and C

1892.10	79°1	49″34	3*n*	β
1898.25	77.4	51.29	3*n*	A
1899.13	76.7	51.20	1*n*	β

[β (**XIII**)...β^{3}...β (3142) (*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I**)... A (3584)...]

3 3 **5336.** **Σ 1409.** The motion is rectilinear. The larger star appears to have a proper motion of 0″064 in 19°.

1833.25	184°2	7″79	3*n*	Σ
1867.44	185.8	9.73	3*n*	Δ
1883.27	187.8	11.11	5*n*	En
1905.23	189.7	12.33	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Flm...Δ (1735)...En (2663)...β^{6}...]

3 29 **5337.** **Σ 1412** *rej.* The only observations are:

1830+	299°5	20″±	1*n*	H (V)	9...13
1905.05	295.4	30.81	1*n*	β^{6}	8...10

3 59: **5338.** **H 153.** I could not find anything in 1904 with the 40-inch which answered the description in Herschel.

5339. **β 790.** Discovered with the 15½-inch at the Washburn Observatory. The measures show no change. The magnitude in SD is 8.8. It is 10^{s} *p* and 3′8 *s* of a 6m star in *Hydra.* 4^{m} 5^{s}

1888.74	70°0	2″18	3*n*	Com	9.0...10.6
1888.96	67.2	2.13	4*n*	Lv	9.2...10.4
1899.09	67.2	1.97	1*n*	β	8.8... 9.5
1901.08	68.6	2.25	4*n*	Doo	

[β (**XII**)...β^{4}...Com (*Pub. Washburn Obsy.* **VI**)...Lv^{1}...β (*Pub. Y. O.* **I**)...]

5342. λ *Hydrae.* **β 593.** The faint companion was noted with the 18½-inch. The proper motion of λ *Hydrae* is given by Auwers as 0″229 in the direction of 251°7. This movement explains the change in the position of B. The following are all the later measures: 4 44

1892.10	118°8	53″58	3*n*	β
1898.98	117.5	54.46	2*n*	β

[β (**X**)...β^{1}...β (3142) (*Pub. L. O.* **II**)...β (*Pub. Y. O.* **I**)...]

5343. Not DM (10°) 2119, but smaller stars 47^{s} f 31 *Leonis*, and not in DM. 4 54

The present relation of DM (10°) 2119, 2118 and 2117 is:

2119 and 2118	1907.06	202°6	339″95	2*n*
2118 and 2117	1907.06	232.8	133.61	2*n*
2117 and 9.6 m	1907.06	195.5	152.31	2*n*

The three stars compared with 2119 are sensibly the same magnitude. The position of 2117 shows some change from the DM place.

5344. **Hu 632.** Discovered at the Lick Observatory (*Bul. L. O.* No. 57). 5 22

5345. **H 476.** (= **OΣ 212** *rej.*) In one observation H calls B 15m. Not seen by Dembowski, 1867.3; easy with 6-inch, 1875. 5 26

1843.27	48°8	24″14	2*n*	Ma
1899.00	48.8	24.36	3*n*	Hu

[Ma (**XI, XIII**)...Δ (**I**, p. 228)...Hu (*Pub. L. O.* **V**)...]

5346. **Ho 44.** Fixed. 5 27

1900.30	189°8	0″50	3*n*	A	8.0...8.2

[Ho (2778)...A (3638) (*Bul. L. O.* No. 11)...]

5347. **Σ 1413.** Fixed. 5 48

1867.92	278°3	2″31	3*n*	Δ

[Ma (*F. S.* **I**)...H (**VIII**)...Ma (**XI**)...Se...Se^{3}...Δ (**II**)...]

(See p. 1072)

5348. **Σ 1414.** Fixed. 6 19

1868.27	92°3	3″97	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**) called Σ 1441...Ma (**XIII**)....Δ (**II**)...]

(See p. 1072)

6^m 22^s **5349.** **OΣ** 213. Probably some change in angle.

1843.27	125°0	0″77	2*n*	Ma
1846.30	122.5	0.78	1*n*	Ma
1851.33	118.8	1.12	1*n*	Ma
1869.19	113.5	1.07	4*n*	Δ
1885.20	107.4	1.02	2*n*	Per
1898.20	102.0	1.02	3*n*	Hu

The components have a proper motion of 0″120 in 180° (Porter).

[Ma (**XI, XIII**) . . . Da^3 . . . OΣ (**IX**) . . . Δ (I) . . . Sk^3 . . . Per . . . Per (2749) . . . Porter (3452) . . . Brown (3645) . . . Hu (*Pub. L. O.* **V**) . . .]

6 29 **5351.** **Σ** 1416. (= **H** 4293.) Fixed. Magnitudes in H 9 . . . 10, but this is probably an error; there is no other pair here.

1867.95	276°9	11″31	4*n*	Δ	7.1 . . . 8.6
1880.90	276.2	11.61	3*n*	β	7.4 . . . 8.6
1903.33	277.1	11.78	2*n*	Hu	

[Ma (*F. S.* **I, II**) . . . Δ (**II**) . . . Cin^5 . . . Wilson (Cin^{10}) . . . β^1 . . . β^3 . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

7 15 **5352.** **H** 477. The only measures are:

AB	1904.85	95°6	9″66	2*n*	β^6	9.3 . . . 9.5
AC	1904.84	1.4	14.46	1*n*	β^6	. . . 13.8

8 1 **5354.** **Lewis** 10. Discovered at the Greenwich Observatory.

[Lewis (*Mon. Not.* **LXIII**, 407, **LXIV**, 796) . . .]

8 11 **5356.** **Σ** 1415. (= **H̤** **N.** 145 = **Sh** 112.) Fixed.

1867.41	166°9	16″72	3*n*	Δ
1893.36	166.8	16.76	2*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . *Gr. Obsns.* 1840 . . . H (**V**) . . . Bl (**V**) . . . Ra (**XXIV**) . . . Δ (1205) . . . . Δ (**I, II**) . . . . Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . . Glasenapp (**II**) . . .]

8 35 **5359.** **Σ** 1417. Fixed.

1867.65	259°6	2″34	3*n*	Δ
1893.32	260.8	2.13	2*n*	Gla

[Ma (*F. S.* **I, II**) . . . Ma (**XI**) . . . H (**V**) . . . Se . . . Se^3 . . . Δ (1119) . . . Δ (**I, II**) . . . Du . . . Per . . . Per (2684) . . . Lv^1 . . . Jones (*A. J.* 312) . . . Glasenapp (**II**) . . . Maw (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

8 36 **5360.** **H** 1176. "Duplex Cl. II." in *O. Arg.* The only measures are:

1902.29	318°5	8″90	2*n*	Es	9.0 . . . 9.2

[Espin (*Mon. Not.* **LXII**, 532) . . .]

8 38 **5361.** **Hu** 633. Discovered at the Lick Observatory (*Bul. L. O.* No. 57).

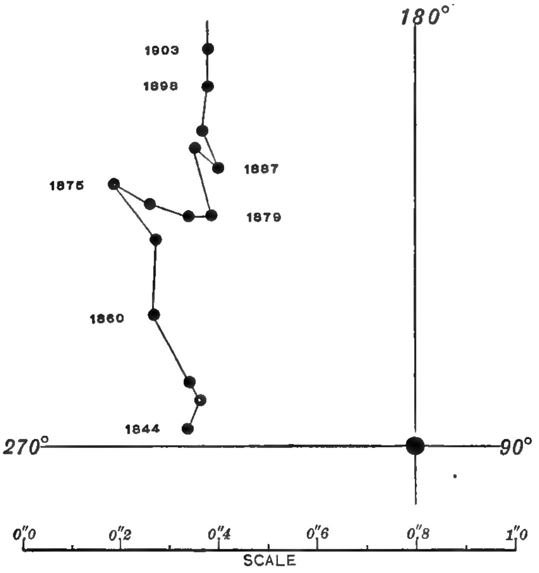
9 23 **5363.** **Hu** 634. Discovered at the Lick Observatory (*Bul. L. O.* No. 57).

9^m 35^s **5364.** **H** 156. Place from H (V), 252°9 : 5″±; 320°0 : 6″± Identified and measured:

AB	1903.95	242°7	19″50	1*n*	β^6	9.6 . . . 11.5
AC	1903.95	316.3	23.09	1*n*	β^6	. . . 11.3

9 44 **5365.** **OΣ** 215. **B. A. C.** 3506. Perhaps binary, but the motion is very slow. Gore, from the measures to 1888, finds a period of 107.94 years. I have heretofore shown (*Popular Astronomy* IV, 543) that the observed positions to this time are much better represented on the hypothesis of rectilinear motion than orbital motion.

The following measures, showing the observed relative motion at short intervals of time for the last sixty years, are given in the diagram:



OΣ 215

1844.54	266°5	0″47	4*n*	OΣ
1848.32	258.5	0.45	2*n*	OΣ
1851.34	254.5	0.48	4*n*	OΣ
1860.30	243.7	0.60	2*n*	OΣ
1869.78	231.5	0.68	2*n*	OΣ
1875.81	229.1	0.82	2*n*	OΣ
1876.69	227.8	0.74	4*n*	Δ
1878.64	224.8	0.66	2*n*	β
1879.25	221.7	0.63	3*n*	Hl
1884.20	216.6	0.76	4*n*	Per
1887.24	215.5	0.70	6*n*	Sp
1889.32	214.2	0.78	5*n*	Maw
1898.05	210.0	0.85	6*n*	Hu
1903.20	207.5	0.92	3*n*	Do

Porter finds from the meridian observations that this star has no sensible proper motion.

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Se . . . Flm . . . Do (2330, 2989, 3378, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Je (2449) . . . Sk^3 . . . T (2991) . . . β^1 . . . β^3 . . . Gore (2998) orbit . . . Gore (*Mon. Not.* **XLVII**, 62) . . . Δ (I) . . . Sp (**II**) . . . Sp (**II**, App.) . . . . Hl (**I, II**) . . . . Hl (*Wash. Obsns.* 1886) . . . . En (2678, 2786) . . . . Per . . . . Per (2685) . . . . Lv (*A. J.* 278) . . . . Jones (*A. J.* 312) . . . . Glasenapp (**II**) . . . . *Proc. Haverford Coll. Obsy.* 1891, 1892 . . . Maw (**I, IV**) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400, **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) . . . Big (*Bul. Ast.* **XII**, 299) . . . Com (*Pub. Washburn Obsy.* **VI, X**) . . . β (*Pop. Ast.* **IV**, 543) . . . Brown (3645) . . . HΣ (**XII**) . . . A (3584) . . . Hu (*A. J.* 427) (*Pub. L. O.* **V**) . . . Doolittle (*A. J.* 547) . . . Biesbroeck]

(See p. 1073)

9m 49s **5366. Ho 45.** The later measures show no change.

1896.32	145°.0	9″.61	2*n*	Ho
1902.10	146.8	9.65	3*n*	Doo

[Ho (2778, 3558)...]

9 58 **5367. Hn 100.** Later measures are:

1902.33	202°.8	1″.93	2*n*	Hu

[*Pub. Washburn Obsy.* **II**, **VI**...Hu (*Bul. L. O.* No. 44)...]

10 1 **5368. ζ and 35** *Leonis.* **Σ 18, App. I.** Change from proper motion, which is mostly in the smaller star.

ζ *Leonis*	0″.009	in 27°.2	Auwers
35 *Leonis*	0.248	in 275.3	Auwers
	0.221	in 279.9	Porter

1851.29	342°.5	316″.80	1*n*	OΣ
1869.64	341.9	318.75	7*n*	Δ
1878.22	341.5	319.49	5*n*	Je
1882.33	341.4	319.98	1*n*	OΣ

[Se^{1}...Ra (**XXVII**)...Flm...Pk...Δ (1736)...Δ (**II**)...OΣ (**X**)...Je (2338)...]

10 39 **5371.** 39 *Leonis.* **OΣ 523.** These stars probably form a physical system, having a common proper motion of 0″.458 in the direction of 259°.5 (Auwers). There is no sensible relative motion.

1861.24	298°.0	6″.96	2*n*	OΣ
1868.45	299.8	6.80	4*n*	Δ
1879.78	298.9	7.02	4*n*	β
1886.36	296.6	7.25	2*n*	Hl
1898.29	298.5	7.15	4*n*	Hu
1901.40	299.1	7.26	4*n*	Doo

[OΣ (**IX**)...OΣ (**X**, p. 198)...Σ (*Pos. Med.* ccxxii)...Da^{3}...Bru^{2}...Δ (**I**)...Hl (*Wash. Obsns.* 1886)...Hl (**I**, **II**)...Pt...β^{1}...β^{3}...En (2678)...Sadler (*Ast. Reg.* **XXIII**, 117)...Flm...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

10 41 **5372. Σ 1419.** Fixed.

1866.80	226°.4	4″.44	3*n*	Δ
1905.05	226.5	4.26	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Se^{3}...Δ (**II**)...*A. G. Leipzig*, p. 208...β^{6}...]

11 5 **5375. Hn 101.** Later measures show no motion:

1898.12	116°.9	1″.27	2*n*	A	6.0...10.2

[*Pub. Washburn Obsy.* **II**, **VI**...A (3584)...]

11 19 **5376. H 3324.** (= **Σ 1418** *rej.*) The only measure is:

1873.23	198°.4	18″.28	1*n*	Δ (I)	9.5...11.0

11 19 **5377. Σ 1421.** Without change.

1869.05	330°.5	4″.45	4*n*	Δ
1896.17	331.4	4.81	1*n*	Lewis

[H^{1}...Ma (*F. S.* **I**)...Ma (**XI**, **XIII**)...Wr...H (**VII**)...Se...Se^{3}...Δ (**II**)...Lewis (*Mon. Not.* **LIX**, 400)...]

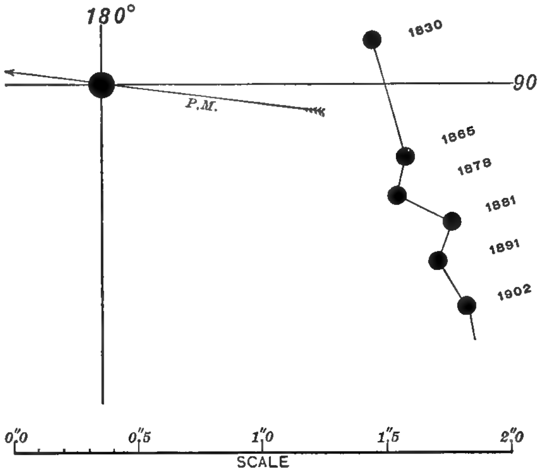
5379. Σ 1420. Unchanged. 11m 29s

1866.60	327°.3	2″.43	3*n*	Δ

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...]

5380. H 831. H (VIII) 128°.0 : 15″ ± : 9...10 (1836.3). 11 34

5385. Σ 1423. This appears to be a system of the 61 *Cygni* type, the relative change being due to the difference of the two proper motions. The meridian observations give for the principal star, 0″.169 in 263°.2 (*A. G. Berlin*). 12 37



Σ 1423

1830.94	99°.3	1″.12	6*n*	Σ
1865.23	76.8	1.27	3*n*	Δ
1878.21	69.7	1.28	1*n*	β
1881.16	68.6	1.52	1*n*	Big
1891.32	62.4	1.54	4*n*	HΣ
1902.39	58.9	1.73	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^{3}...Flm...En (1674)...Δ (1572)...Δ (**II**)...Pt...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Bru^{2}...β^{1}...Sk^{2}...Big...Brown (3645)...HΣ (**XII**)...Sk^{5}...Biesbroeck...]

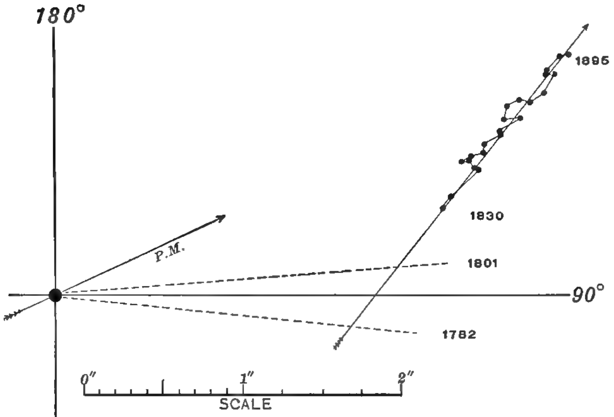
5386. ♅ I. 71. ♅ called this Σ 1422, but that was properly rejected by Σ as single. In *Pos. Med.* that is *Ursae Majoris* 138, agreeing with ♅'s place. I have examined this star under favorable conditions (1874–75) and always found it round with all powers. There is very little doubt of Herschel's pair being really Σ 1428. 12 46

5388. γ *Leonis.* **Σ 1424.** (= **♅ I. 28 = Sh 113.**) Generally regarded heretofore as a binary; but I have shown (*Mon. Not.* LVIII, 387) that the apparent motion is rectilinear and uniform so far as the observations are concerned. Considering A as stationary, the companion has an annual movement of 0″.019 in 141°.7. The principal star, however, has a proper motion of 0″.322 in 115°.0 (Auwers), and evidently the 13 20 companion is moving in nearly the same direction, at a slightly different rate, or 0″.340 in 116°.4. The system evidently belongs to the 61 *Cygni* type.

Each position shown on the accompanying diagram is a mean, on the average, of measures on 27 nights. Altogether these positions give the results of the measures by different observers on more than 600 nights. A list of these positions will be found in the paper above referred to.

Three orbits have been computed:

1845	Hind	296 yrs.	*Mon. Not.* VII, 96
1875	Doberck	402.62	*Trans. R. I. Acad.* XXV
1879	Doberck	407.04	*A. N.* 2248



γ Leonis. Σ 1424

Some of the recent positions are the following:

1896.99	115°.7	3″.91	6*n*	Ho
1897.90	114.9	3.86	3*n*	Hu
1898.33	114.6	3.85	3*n*	Hu
1902.23	115.6	3.87	1*n*	Hu
1903.27	116.6	3.71	2*n*	Biesbroeck
1904.27	116.1	3.74	3*n*	Salet

[Ma (324, 413, 430) .... Ma (**IX, X, XI, XIII, XV**) .... Ma (*F. S.* **I**) ... Bes.... BM (280) ... P1 ... P2 ... Ek (**I, III**) ... K (1519) ... H1 ... H2 ... H (**II, V**) ... K ... K (409) ... Auwers (1393) ... Da (*Mem. R. A. S.* **V**, 139) ... J2 ... J3 ... WJ2 ... Bp ... Wh ... Da1 ... Da2 ... Da3 ... Da4 ... Lu (**II, III**) ... Bond (*Am. Acad.* **II**, 144) ... Wn (**V**) ... Wn (1738) ... Hind (*Mon. Not.* **VII**, 96) .. Se ... Se2 ... Se3 ... Se (1017, 1614) ... *Durham Obsns.* 1846–48 ... Cooper (2155) ... Wr ... Kn ... WS ... WS2 ... Gl ... Sk ... Sk2 ... Sk3 ... T (2866) ... Hd ... Flm ... Ba (**I, II, III, IV**) ... Ra (**XXII, XXVII, XXVIII, XXXI, XXXV, XXXVIII**) ... Schmidt (1543) ... Du ... *Nature* **XIX**, 484 ... Do (2049, 2101, 2197, 2199, 2248, 2433, 2989, 3378, 3799, 3930) (*Trans. R. I. Acad.* **XXV**, 594; **XXIX**, Part 13) (*Observatory* **II**, 212) (*Mon. Not.* **XXXV**, 397) ... En (1518, 1674, 2663, 2742) ... Sp (2133) ... Sp (**I, II**) ... Sp (**II**, App) ... Bru2 (pp. 73, 81) ... OΣ (**IX**) (**X**, pp. 84, 164) ... Sadler (*Mon. Not.* Jan. 1879) ... Pl ... Pk ... Waldo (2190) ... Δ (1026, 1111, 1256, 1474, 1735, 1886, 2079) ... Δ (*Mem. Accad. Sci.*) ... Δ (**I, II**) ... Je (2347, 2449) ... *Proc. Haverford Coll. Obsy.* 1891, 1892 .... Jones (*A. J.* 312) .... Pt .... Perry (*Ast. Reg.* **XIX**, 176) ... Per ... Per (2684) ... Kustner (2584) ... Franz (2590) ... Lv (*A. J.* 278) ... Hl (*Wash. Obsns.* 1880, 1883) ... Hl (**I, II**) ... Hl (*A. J.* 269) ... Perry (*Eng. Mech.* **XXXVIII**, 192) ... Sadler (*Eng. Mech.* **XXXIX**, 537) ... Knorre and See (*Beob. Berlin* 1892) ... Hayn (3051) ... Ho (2978, 3234, 3558) ... β (2930) (*Pub. L. O.* **II**) (*Mon. Not.* **LI**, 391) ... Big ... Maw (**I, IV**) ... Glasenapp (**II, III**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LVI**, 359; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) ... Big (*Bul. Ast.* **XII**, 299) .... Cohn (3240) .... Hagen (3258) .... Collins (*A. J.* 378) .... β (*Pop. Ast.* **IV**, 172) .... Com (*Pub. Washburn Obsy.* **VI, X**) .... Knorre (3300) .... Ebell (3321) ... Schwarzschild (3335) ... Searle (*A. J.* 299) ... Glasenapp (**IV, V**) ... Scott (*Brit. Ast. Ass'n* **VIII**, 66) .... Hu (*A. J.* 427) .... Brown (3645) .... HΣ (**XII**) ... Gl (*Mon. Not.* **LXI**, 556) ... *Annals Toulouse Obsy.* **III** ... Je (3802) .... *Annals Roy. Obsy. Edinburgh* **I**.... Coleman (*Mem. R. A. S.* **LIV**) .... Biesbroeck ... Salet (*Bul. Ast.* **XXII**, 208) ...]

5389. **Innes 206.** Discovered at the Cape of Good Hope. 13m 27s

[Innes (3438) (*Mon. Not.* **LXIII**, 76) ...]

5390. **H 5479.** A star in this place noted as double in *Harvard Zones*, distance 28″. The only measures are: 13 28

1904.06	350°.6	28″.29	2*n*	β^6	9.2...12.0

5394. **Ho 531.** The only later position is the following: 14 3

1903.25	129°.3	2″.27	3*n*	Doo

[Ho (3557) ...]

5395. **Σ 1425.** Fixed. 14 13

1868.20	359°.3	4″.70	3*n*	Δ

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... Se3 ... Δ (**II**) ...]

5396. **Hn 102.** Discovered by Holden at the Washburn Observatory. Measures by Comstock. 14 14

[*Pub. Washburn Obsy.* **II, VI** ...]

5397. *Leonis* 145. **Σ 1426.** (AC = **H II. 43** = **Sh 114.**) Close pair probably binary with slow direct motion. There is no change in C. The faint star, D, added by Hall. 14 15

A and B

1847.30	263°.2	0″.80	4*n*	OΣ
1854.16	263.3	0.88	1*n*	Da
1870.98	270.4	0.73	5*n*	Δ
1876.36	276.9	0.66	2*n*	Hl
1877.82	273.2	0.84	3*n*	Sp
1884.98	277.7	0.76	6*n*	Hl
1887.56	277.3	0.75	7*n*	Sp
1893.19	280.1	0.83	2*n*	Gla
1897.30	280.8	0.84	3*n*	Brown
1902.37	285.2	0.76	2*n*	A
1903.24	283.2	0.80	3*n*	Bowyer

AB and C

1847.30	9°.3	7″.85	4*n*	OΣ
1867.17	9.7	7.57	3*n*	Δ
1876.36	9.9	7.92	2*n*	Hl
1885.10	9.5	7.70	5*n*	Hl
1887.56	9.7	7.67	4*n*	Sp
1897.15	7.4	7.66	2*n*	Hu
1902.37	10.0	7.46	2*n*	A

[Ma (*F. S.* **I**) ... Ma (**X, XIII**) ... Se ... Se3 ... Se (*Comp. Rend.* **XLVIII**, 375) ... Ba (**III, IV**) ... Da3 ... Bp ... Hd ... WS ... WS2 ... Gl ... Sk ... Ra (**XXXIX**) ... OΣ (**IX**) .... Do (2197, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Flm .... T (2898) .... En (2663) .... Sp (**II**) .... Sp (**II**, App) .... Δ (**II**) .... Hl (**I, II**) .... Hl (*Wash. Obsns.* 1884, 1886) ... Jones (*A. J.* 312) ... Glasenapp (**II**) ... Big (*Bul. Ast.* **XII**, 299) ... Hu (*A. J.* 427) ... Brown (3645) ... *A. G. Leipzig*, p. 248 ... HΣ (**XII**) ... Sk5 ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) ...]

5398. **Σ 1410.** (= **OΣ 214** *rej.*) Struve refers to a 11m star, 351°.7 : 42″. Hussey points out that the effect of precession is to increase the position angle annually 0°.04. 14 22

1867.63	339°.4	14″.07	3*n*	Δ
1898.22	340.5	14.30	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XIII**) as OΣ 214 ... OΣ (**IX**) ... Δ (**II**) ... Hu (*Pub. L. O.* **V**) ...]

14^{m} 35^{s} **5399.** **H** 4303. The measures disagree in distance:

1876.11	266°.7	9″.37	1*n*	Cin	8.5...9.0
1879.21	265.9	8.41	1*n*	Cin	8.0...8.8

[Cin^{3}...Cin^{4}...Cin^{5}...]

14 46 **5400.** **Σ** 1427. Fixed.

1866.16	214°.5	9″.48	3*n*	*Δ*
1889.23	213.5	9.59	4*n*	Giacomelli

[Ma (*F. S.* **I**)...Se...Ra (**XXIV**)...Δ (1205)...*Δ* (**I, II**)...Espin (*Mon. Not.* **LXII**, 529)...Giacomelli (**II**)...]

14 47 **5401.** **Hn** 103. No other measures.

[*Pub. Washburn Obsy.* **II**, **VI**...]

14 50 **5402.** **Hn** 104. No other measures.

[*Pub. Washburn Obsy.* **II**, **VI**...]

14 54 **5403.** **Kr** 36. Noted "duplex" in *A. G. Hels.*

1898.35	242°.5	5″.80	3*n*	Doo

[*β* (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5404. **H** 4305. Probably unchanged.

1882.19	215°.4	17″.78	3*n*	Wilson	7.6...9.5

[Cin^{5}...Cin^{6}...Wilson (Cin^{10})...]

15 39 **5406.** **β** 1321. First noted many years ago in looking for H 2599 (No. 5413). Measures from *β*^{6}. (See No. 13197)

15 46 **5407.** **β** 25. Discovered with the 6-inch but it had been previously seen by Schjellerup (*A. N.* 1485; *Catalogue of 10,000 Stars*, p. XXIV). The measures are discordant in angle, and there is probably no sensible motion.

1875.23	180°.5	1″.76	4*n*	*Δ*
1878.23	179.6	1.66	2*n*	Cin
1881.19	180.9	1.78	3*n*	*β*
1890.22	176.5	1.79	3*n*	T
1900.35	177.0	1.90	2*n*	Doo

[*β* (**I**)...*β* (*Mon. Not.* **XXXIII**, 351)...*β*^{3}...Hd...*Δ* (**I**)...Du...Cin^{5}...LM...Lv^{1}...Pt...T (3186)...Do (3799)...Doolittle (*Pub. Flower Obsy.* **I**)...Scott (*Mon. Not.* **LXIV**, 52)...]

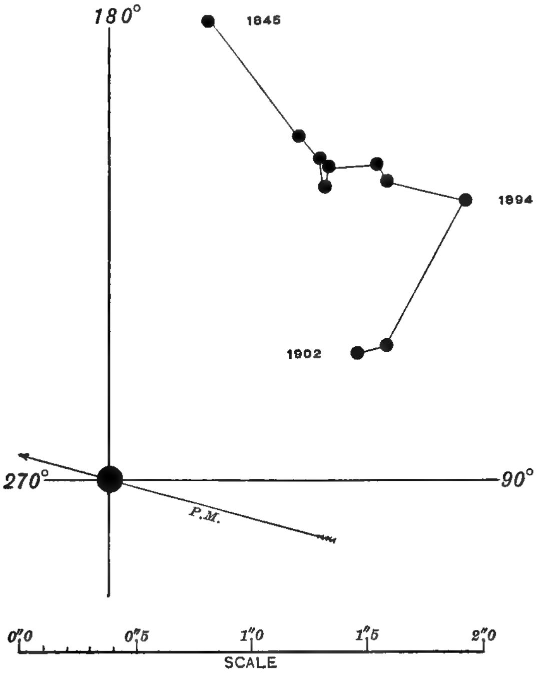
15 56 **5408.** **β** 219. Discovered with the 6-inch. Evidently fixed. The principal star is 6.5 m in Cord. G. C., No. 14126.

1892.26	186°.4	2″.07	3*n*	*β*	7.0...8.5
1899.26	186.9	2.15	1*n*	*β*	7.5...8.3
1901.15	187.7	2.20	4*n*	Doo	

[*β* (**IV**)...*β* (*Mon. Not.* **XXXIV**, 382)...*β* (3142)(*Pub. L. O.* **II**)...Cin^{3}...Cin^{5}...Collins and Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* **II**)...]

5409. **OΣ** 216. (= **β** 594 *rej.*) The best of the measures have too much error to make it possible to decide as to the character of the motion. The large star has a considerable proper motion. 16^{m} 20^{s}

Porter	0″.314 in 254°.9
A. G. Berlin	0.313 in 251.0



OΣ 216

1845.62	167°.9	2″.06	3*n*	OΣ
1866.89	151.0	1.70	3*n*	*Δ*
1872.57	146.4	1.66	3*n*	*Δ*
1878.24	143.4	1.58	1*n*	*β*
1880.51	144.4	1.66	2*n*	Pt
1883.53	139.6	1.80	7*n*	En
1886.57	136.9	1.77	3*n*	HΣ
1894.86	127.9	1.47	5*n*	HΣ
1900.31	115.3	1.35	2*n*	Hu
1902.27	116.8	1.22	8*n*	Gr. Obsy.

[Ma (**XI, XIII**)...OΣ (**IX**)...*Δ* (**I**, pp. 164, 343)...*β*^{1}...Sp (**III**)...Do (2322)...Pt...Flm...En (2678)...Big (*Bul. Ast.* **XII**, 299)...HΣ (**XII**, pp. 150, 190)...Greenwich Obsy. (*Mon. Not.* **LX** 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

5410. **β** 912. Discovered with the 6-inch. Probably without change. The magnitude in SD is 8.7. 16 26

1894.19	106°.0	1″.30	2*n*	Wilson
1898.30	104.4	1.14	4*n*	A
1901.13	99.6	1.21	2*n*	Doo

[*β* (**XIII**)...*β*^{3}...Cin^{6}...Wilson (Cin^{10})...A (3584)...Doolittle (*Pub. Flower Obsy.* **II**)...]

$17^m\ 2^s$ **5412.** **Leonis 155. Sh 115.** (= **H** V.64 = σ 362.) Lalande 20142. Change in the angle from proper motion. The proper motion of A is:

Porter	0″.286 in 260°.3
OΣ—β	0.265 in 256.9

The last is the most probable value derived from the five positions of OΣ and β.

The following are all the measures:

1785.09	.....	59″.67	1*n*	H	
1840.28	331°.8	60.26	1*n*	OΣ	6.5...9.5
1868.29	338.5	59.02	1*n*	OΣ	
1879.23	341.1	58.98	1*n*	OΣ	
1879.34	341.2	59.47	2*n*	Cin	6.5...8.5
1880.27	341.7	58.59	3*n*	β	7.0...8.7
1880.56	341.9	58.15	3*n*	Doubiago	
1903.06	347.9	58.11	4*n*	β	7.0...9.5

[OΣ (**X**, p. 21)...Cin^{5}...β^{3}...β^{6}...]

17 19 **5413.** **H 2529.** "A most curious, delicate, and interesting object. The nucleus of a very faint nebula." A fourth star 14–15 m, 330° : 6″, suspected by H. The note by H appears to indicate that the close pair is the nucleus of a nebula. As a matter of fact, H's small star C is the nebula itself, which with the 36-inch is about 25″ in length. It has a condensed nucleus, but apparently not stellar. The nebula is Dreyer 3230. This was examined by me in 1879 and 1882 with the Chicago 18½-inch, but there was no trace of H's star B, and the 36-inch at Mt. Hamilton in 1889 failed to show any close pair upon repeated examinations. The measures of the star and nebula at these dates show no motion, and it is therefore probable that there is some mistake in the description by Herschel.

1880.72	7°.9	18″.96	2*n*	β	10...
1889.18	7.8	18.96	1*n*	Bar	10...
1903.25	6.5	18.86	3*n*	β	10...

Observations will be also found in the nebula work of d'Arrest and Rosse.

The 18½-inch showed a 13 m star, 230° : 8″ from A. This is probably the star suspected by H, and printed with an error of 90° or 100° in the angle.

[β^{3}...Barnard (*Mon. Not.* **XLIX**, 418)...Sadler (*Observatory*, **VIII**, 127)...β^{6}...]

17 26 **5414.** **H 4311.** "Exceedingly delicate." Easy with the 6-inch in 1874. In Lalande 6½ m, but not in Heis. Probably fixed.

1867.30	130°.0	3″.69	1*n*	Hd	7.0...11.0
1878.42	124.3	3.88	1*n*	β	
1903.99	125.7	3.90	2*n*	β	7.4...10.5

[Hd...Cin^{4}...Cin^{5}...β^{1}...LM...β^{6}...]

17 27 **5415.** **OΣ (App) 104.** Without change.

1904.93	286°.2	207″.60	1*n*	β

[Δ (I)...Franz (3080)...β^{6}...]

5417. **Hn 105.** Discovered by Holden. Measures by Comstock. $18^m\ 0^s$

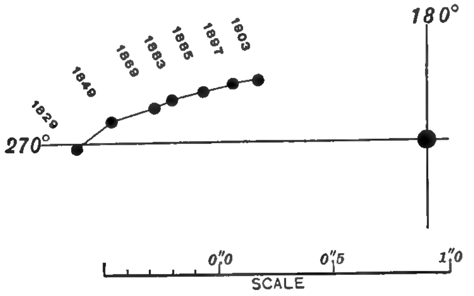
[*Pub. Washburn Obsy.* **II, VI**...]

5418. **β 1322.** (AC = **H 2530.**) C is Lalande 20171. No other direct measures of AC. The meridian positions give: 18 1

1800	64°.9	212″.67	Lalande
1880	64.4	212.26	*A. G. Albany*

[β^{6}...]

5421. **Σ 1429.** Slow retrograde motion in angle, and distance decreasing. The motion is practically rectilinear. Some of the measures are very discordant, particularly in distance. 18 22



Σ 1429

1829.28	270°.6	1″.52	3*n*	Σ
1849.76	265.8	1.37	1*n*	Da
1869.17	262.4	1.19	4*n*	Δ
1883.41	259.9	1.12	6*n*	En
1885.34	257.3	0.98	3*n*	Hl
1897.29	252.5	0.87	2*n*	Brown
1903.39	249.2	0.77	1*n*	Biesbroeck

[Ma (*F. S.* **I**)....Ma (**XI**)....Da^{3}....Se....Se^{3}....Do (2194)....WS....WS^{2}... Δ (2194)...Sk^{2}...Δ (**II**)... Flm ... Hl (*Wash. Obsns.* 1885)...Hl (**I, II**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)....Big.... Brown (3645) ....HΣ (**XII**)....Biesbroeck...]

5422. **Σ 1428.** Probably fixed. These stars have a proper motion of 0″.054 in 262°.6 (*A. G. Harvard*). 18 25

1859.26	86°.2	3″.42	2*n*	Wr
1869.23	85.9	3.45	5*n*	Δ
1887.26	85.8	3.52	2*n*	Hl
1898.44	86.0	3.35	4*n*	Doo

[Ma (*F. S.* **I**)... H^{1}... Se... H (**V**)... Wr...Ra (**XXII, XXVI**)... Flm... Du... Bl (**V**) ... Δ (1205) ... Δ (**I, II**) ... Pt ... Hl (**I, II**) ... Big ... Seagrave (*Sid. Mess.* **II**, 22)....Sk^{3}...Sk^{4}....Sk^{5}.... Collins (*A. J.* 378)....Doolittle (*Pub. Flower Obsy.* **I**)...Boeger (*A. J.* 522)...Do (3799)...]

5423. **Σ 1430** *rej.* There is a faint companion a little nearer than that noted by Struve. The only measures are: 18 35

AC	1904.95	236°.8	22″.88	2*n*	β^{6}	8.4...10.6
AB	1904.97	268.6	21.23	1*n*	β^{6}	...12.0

$19^{m}\ 16^{s}$ **5426.** Σ 1431. (= H I. 29 = S 608.) No certain change.

1782.13	63°5	....	1*n*	H
1842.25	67.3	2″92	3*n*	Ma
1866.92	68.2	3.15	3*n*	Δ
1881.31	67.9	3.33	2*n*	Sp
1887.18	66.2	3.33	3*n*	T
1888.70	70.4	3.66	3*n*	Maw
1896.33	66.5	3.32	4*n*	Coleman

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...Da²...H (**VII**)...Se...Se³...Gl...Δ (II)...Sp (**II**)...Maw (I)...T (2898)...Coleman (*Mem. R. A. S.* **LIII**)...*A. G. Leipzig*, p. 248...]

19 55 **5428.** β 1280. Noted with the 36-inch, but omitted from the Mt. Hamilton lists. The only measures of the close pair are those by Aitken, given in Part I and the following

1904.78	17°7	0″76	6*n*	Doo

[β (*Pub. Y. O.* I)...A (3638)...Doolittle (*Pub. Flower Obsy.* **II**)...]

20 14 **5429.** Σ 1432. No motion.

1866.89	123°8	29″31	3*n*	Δ
1880.22	123.2	28.69	1*n*	β
1903.94	122.3	29.26	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β^3...β^6...]

20 24 **5431.** OΣ 217. The change, if any, is in distance only. The components have a proper motion of 0″041 in 223°6 (*A. G. Berlin*).

1846.29	152°8	0″42	1*n*	Ma
1869.63	148.3	0.72	5*n*	Δ
1883.44	146.8	0.99	5*n*	En
1884.21	152.1	0.84	4*n*	Per
1898.16	150.5	0.92	4*n*	Hu
1903.22	148.0	0.80	2*n*	Bowyer

[Ma (**XI, XIII**)...OΣ (**IX**)...Se...Δ (I)...Sk³...Per...Per (2685)...En (2678)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

20 38 **5433.** Σ 1434. Probably fixed.

1856.80	271°1	6″19	2*n*	Se
1866.43	272.2	6.07	3*n*	Δ
1893.31	273.4	6.22	2*n*	Gla

[Ma (*F. S.* I)...Wr...Se...Se³...Δ (II)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

21 11 **5434.** Hu 635. Discovered by Hussey (*Bul. L. O.* No. 57).

21 18 **5436.** 45 *Leonis.* **H 832.** The proper motion of the principal star is 0″022 in 312°7 (Auwers). The only measures are:

1904.00	131°7	38″63	2*n*	β^6	...12.1

5437. OΣ 218. (= β 1281 *rej.*) Probably some change in the angle. The components have a common proper motion of 0″149 in 264°2. $21^{m}\ 18^{s}$

1843.28	58°4	0″83	2*n*	Ma
1851.28	60.3	1.22	1*n*	Ma
1857.34	65.2	0.91	1*n*	Se
1870.13	66.2	1.06	7*n*	Δ
1889.01	69.5	1.06	3*n*	Lv
1898.67	70.6	1.15	5*n*	Hu
1899.26	71.8	0.87	4*n*	β

[Ma (**XI, XIII**)...Se...OΣ (**IX**)...Δ (**I**)...Flm...Pt...Lv¹...Do (2322)...Greenwich Obsy. (*Mon. Not.* **LIV**, 315; **LIX**, 400; **LX**, 501; **LXII**, 383; **LXIV**, 796)...Brown (3645)...Hu (*Pub. L. O.* **V**)...β (*Pub. Y. O.* **I**, pp. 110, 291)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

5438. Σ 1435. Fixed. 21 25

1869.22	202°7	8″18	4*n*	Δ
1902.39	202.4	8.48	1*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...Cin⁵...*Annals Toulouse Obsy.* **III**...]

5439. H 1179. In the *Harvard Zones* there is a "suspected double" 12 m in this place. Since Part I was in type I have identified this as the 9.5 m star, DM (0°) 2656. 21 41

1905.06	124°7	14″77	2*n*	β^6	9.6...11.6

5441. Σ 1438 *rej.* The only measures are: 22 7

1903.26	247°8	14″69	4*n*	Cogshall	8.9...10.5

[Cogshall (4022)...]

5442. H 2532. "Neat star." The only measures are: 22 35

1874.17	70°2	12″65	2*n*	Δ	9.3...9.6

[H (**VI**)...Δ (**I**)...] (See p. 1073)

5443. Σ 1436. Fixed. 22 38

1867.81	252°3	10″26	3*n*	Δ
1905.05	253.0	10.53	1*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...Bl (**V**)...Δ (**II**)...β^6...]

5444. OΣ 219. Probably unchanged. The principal star is given a proper motion of 0″048 in 228°6 (*A. G. Harvard*). (See No. 5471.) 22 44

1867.93	297°2	12″78	3*n*	Δ
1883.46	298.2	13.41	6*n*	En
1898.61	297.8	13.25	4*n*	Hu
1903.27	298.3	13.37	2*n*	Do

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...En (2678)...Hu (*Pub. L. O.* **V**)...Do (3930)...Doolittle (*Pub. Flower Obsy.* **II**)...]

5445. OΣ 220. B. A. C. 3583. Probably without change. 22 51

1869.00	64°9	1.26	4*n*	Δ
1884.21	65.4	1.13	4*n*	Per
1898.25	64.4	1.54	3*n*	Hu

[Ma (**XI, XIII**)...Da³...Se...OΣ (**IX**)...Δ (**I**)...Per...Per (2685)...Hu (*Pub. L. O.* **V**)...]

23m 10s **5446.** **OΣ (App) 105.** Very little if any change.

1904.94	225°3	131″26	2*n*	β

[Δ (I)...Franz (3464)...β^6...]

23 32 **5448.** **Σ 1439.** Slow retrograde motion. The components have a common proper motion of 0″126 in 129°3 (*A. G. Berlin*).

1829.26	131°4	2″02	2*n*	Σ
1842.30	128.6	2.00	2*n*	Ma
1856.78	123.4	1.98	2*n*	Se
1868.29	123.9	1.89	1*n*	OΣ
1868.72	122.5	1.81	4*n*	Δ
1879.24	121.4	1.85	3*n*	Hl
1884.18	118.5	1.88	2*n*	Per
1888.26	119.9	1.78	3*n*	Hl
1893.30	116.4	1.62	3*n*	Lewis
1895.38	117.8	2.05	2*n*	Collins
1897.28	115.2	1.92	3*n*	Brown
1903.07	113.7	1.69	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**X**)...Bp...Da^3...Se...Se^3...Ba (**II, III, IV**)...H (**V**)...OΣ (**IX, X**)...En (1674, 2663)...Do (2303, 3930)...Flm...Δ (1800)...Gl...WS^2...Sk^2...Sk^5...Hl (**I, II**)...Δ (**II**)...Glasenapp (**II**)...Per...Per (2684, 2748)...Sp (**II**)...Lewis (*Mon. Not.* **LIV**, 316; **LXIII**, 403)...Collins (*A. J.* 378)...Brown (3645)...HΣ (**XII**)...Boeger (*A. J.* 522)...Coleman (*Mem. R. A. S.* **LIV**)...]

23 45 **5451.** **Σ 1440.** (= **H 163.**) Fixed.

1866.88	346°8	15″15	3*n*	Δ
1882.73	347.1	15.52	2*n*	Wilson

[Ma (*F. S.* **I**)...Ma (**X**)...Δ (**II**)...Cin^5...Cin^6...Wilson (Cin^{10})...]

24 0 **5452.** **Ho 372.** Third star 9 m, 204°2 : 47″49.

AB	1905.12	79°1	13″99	3*n*	Doo
AC	1905.12	203.7	47.16	3*n*	Doo

[Ho (3233)...]

24 4 **5453.** δ *Antliae.* **H 4321.** (= **H N. 50.**) Probably fixed.

1877.10	225°7	11″11	2*n*	Cin	5.8...9.5
1888.66	224.0	11.04	2*n*	Lv	5.5...8.5
1890.24	226.0	10.71	1*n*	Com	
1897.26	226.2	11.32	2*n*	See	

[J^2...J^3...Flm...Pt...Cin^4...Lv^1...Com (**VI**)...Lv (*Sid. Mess.* **VII**, 172)...See (3496)...]

24 31 **5455.** **Σ 1437.** Fixed.

1869.22	289°8	23″57	4*n*	Δ
1905.05	289.9	23.24	1*n*	β

[H (**V**)...Ma (*F. S.* **II**)...Δ (**II**)...β^6...]

24 53 **5458.** 33 *Leonis Minoris.* **H 482.** The large star has a proper motion of 0″023 in 344°0 (Auwers). The only observations are:

1830	237°0	20″ ±	1*n*	H (V)	6...16
1903.06	244.6	40.21	2*n*	β^6	...13

5459. **Σ 1441.** B. A. C. 3603. Without change. 24m 58

1867.25	166°4	2″77	3*n*	Δ
1878.75	166.3	2.46	2*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Se^3...Wr...Δ (**II**)...Cin^5...**LM**...]

5460. **H 483.** The magnitude in DM is 8.6. The only later observations are: 25 11

1830	140°9	12″ ±	1*n*	H (V)	10 ...12
1905.12	136.1	14.98	1*n*	β^6	8.8...11.5

5461. **Σ 1442.** (= **S 609** = **OΣ 221** *rej.*) Fixed. 25 25

1866.75	155°7	13″25	3*n*	Δ
1880.37	154.2	13.18	1*n*	β
1903.29	155.4	13.18	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...H (**II, V**)...Ma (**XI**)...Da^2...Da^3...Se^1...Se^3...Lassell (858) (*Mon. Not.* **XIII**, 183)...OΣ (**IX**)...Ra (**XXIV**)...Δ (1205)...Δ (**I, II**)...Per...Per (2684, 2748)...β^3...Giacomelli (**II**)...Sp (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

5462. **Hu 636.** Discovered by Hussey (*Bul. L. O.* No. 57). 25 27

5463 **H 2533.** The principal star is 9.3 m in DM. The only later observation is the following: 25 27

1880.26	330°7	9″30	1*n*	Big

5464. **H 484.** Nothing later but this: 25 49

1904.89	202°2	12″54	2*n*	β^6	10.2...11.7

5466. **H 2534.** "A third farther." H calls this 32 *Leonis Minoris*, but that is an error. There is a mistake of 10′ in the Decl. by H, the correct place being as given here. The principal star has a proper motion of 0″113 in 270°0 (Bossert). 26 14

These are all the measures:

1879.25	315°8	24″64	2*n*	β^3	5.7...12.2
1903.98	321.7	23.12	3*n*	β^6	...12.5

5468. **Σ 1443.** Fixed. 26 21

1868.22	157°3	4″80	3*n*	Δ

[Ma (*F. S.* **I**)...H (**V, VI**)...Ma (**XI**)...Se...Δ (**II**)...] (See p. 1073)

5469. *Sextantis* 101. **β 1073.** Discovered with the 36-inch. No material change. Lalande 20428. Magnitude in Lalande 6½; in SD 7.2. 26 26

1898.13	46°8	3″42	2*n*	A
1902.36	41.9	3.31	3*n*	Doo

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...A (3584)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

26^m 35^s **5470.** **Σ 1445.** As the later measures show no change, it is probable that Struve's angle is too large.

1844.29	160°.9	3″.41	1*n*	Ma
1864.88	159.4	2.95	3*n*	Δ
1880.14	161.7	2.81	3*n*	β
1883.73	161.0	3.10	6*n*	En

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**VII**)... Δ (1572)... Δ (**II**)... Flm... T (3185)... β^1 ...β^3... Pt... En (2663)... Brown (3645)...]

26 43 **5471.** **H 2535.** There is no star in this place in the DM. This star is probably identical with OΣ 219 which is 4^m *p*. (No. 5444.)

27 7 **5472.** **Σ 1446.** Unchanged.

1868.40	251°.7	5″.43	4*n*	Δ
1905.14	251.1	5.54	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**VIII**)... Se... Se^3... Δ (**II**)... β^6...]

27 13 **5474.** **Σ 1447.** Unchanged. The proper motion in *A. G. Berlin* is:

A = 0″.056 in 280°.3
B = 0.042 in 283.7

1867.36	123°.9	4″.25	4*n*	Δ
1894.31	126.9	4.16	2*n*	Coleman

[H^1... H^2... Ma (*F. S.* **I**)... Ma (**XI**)... Wr... Se... Se^3... Δ (**II**)... Glasenapp (**II**)... Coleman (*Mem. R. A. S.* **LIII**)... *Annals Toulouse Obsy.* **III**...]

27 27 **5475.** **Σ 1444** *rej.* From H (VI). The magnitude in DM is 8.2.

27 51 **5476.** **Σ 1448.** Fixed.

1868.95	259°.3	10″.66	4*n*	Δ
1902.39	259.2	10.98	1*n*	Hu

[Ma (*F. S.* **I**).... Ma (**XI**).... H (**V**).... Se.... Wr.... Δ (**II**).... Glasenapp (**II**).... *Annals Toulouse Obsy* **III**...]

28 3 **5477.** **S 610.** B is O.Arg. S. 10720. The only observation since South is:

1905.14	42°.7	104″.60	1*n*	β^6	8.3...8.5

The apparent change is very decided. (See p. 1073)

28 15 **5478.** **Σ 1449.** The companion is DM (35°) 2158. The change is due to proper motion. The 40-inch shows a 12.5m star nearer A, 212°:30″.5.

1866.18	288°.3	36″.62	3*n*	Δ
1903.43	287.2	37.76	3*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)... β^6...]

5480. **44 Hydrae.** **β 1269.** Distant companion noted with the 36-inch. The principal star has a proper motion of 0″.047 in the direction of 309°.9 (Auwers). 28^m 18^s

1898.22	59°.7	19″.09	1*n*	See
1899.04	59.9	18.75	2*n*	β
1900.11	60.9	19.14	2*n*	A

[β (**XIX**)... β (3141) (*Pub. L. O.* **II**)... See ( )... A (*Bul. L. O.* No. 11)...]

5481. **β 1074.** Discovered with the 36-inch. The magnitude in DM is 7.2. 28 20

1899.33	205°.0	2″.50	2*n*	A
1901.27	203.9	2.62	3*n*	Doo

[β (**XV**).... β (2929) (*Pub. L. O.* **II**).... A (3638).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**).... Lewis (*Mon. Not.* **LXIII**, 403)....]

5483. **H 4331.** Examined (1876) and distance not less than 2″. 28 34

5484. 49 *Leonis.* **Σ 1450.** Some of the many measures of this pair are discordant, and it seems certain now that the stars are relatively fixed, but they have a common proper motion of 0″.064 in 276°.3 (Auwers). The following selected measures are sufficient to show that there has been no change in the last fifty years. 28 45

1842.29	158°.9	2″.59	4*n*	Ma
1868.81	156.7	2.36	5*n*	Δ
1870.29	158.3	2.38	3*n*	OΣ
1876.14	156.4	2.44	6*n*	Sp
1878.33	159.8	2.40	2*n*	Hl
1881.46	158.3	2.42	5*n*	Je
1886.28	158.8	2.39	2*n*	Hl
1893.32	157.8	2.41	4*n*	Lewis
1898.27	157.9	2.38	5*n*	Hu
1903.38	156.3	2.38	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)... Da^3... Bp... Bru... Se... Se^3... Ba (**II, IV**)... Ra (**XXIII**)... Hd... Bru^2 (p. 73, 81)... WS... WS^2... Gl... Sk^2... Ferr... Δ (**II**)... Je (2449)... Sp (**II**)... Per... Per (2684)... Flm... Lv^1... T (2898).... Hl (*Wash. Obsns.* 1886).... Hl (**I, II**).... OΣ (**IX, X**).... Big.... Maw (**I**)... Glasenapp (**II**)... Lewis (*Mon. Not.* **LIV**, 316)... Brown (3645)... Coleman (*Mem. R. A. S.* **LIII**)... Do (3930)... Biesbroeck...]

5485. **Σ 1451.** (AC = **H** 486.) The distant star is not mentioned by Σ. No material change in the Struve companion. 28 45

1867.29	268°.7	8″.26	3*n*	Δ
1903.11	271.2	8.17	2*n*	β

The only measure of the Herschel star is:

1903.11	329°.3	40″.07	2*n*	β	...12.5

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**VII**)... Δ (**II**)... β^6...]

5486. **H 487.** Probably fixed. 29 28

1879.24	360°.4	12″.06	1*n*	β	9.0...9.0
1880.23	361.0	13.12	1*n*	Big	
1904.94	361.1	12.61	2*n*	β	

[β^3... Big... β^6...]

$29^{m}\ 37^{s}$ **5487.** **Σ 1452.** Without change.

1867.55	328°.1	10″.20	3*n*	*Δ*

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...*Δ* (**II**)...]

(See p. 1073)

29 40 **5488.** **Hn 107.** Measures by Comstock.

[*Pub. Washburn Obsy.* **II, VI**...]

29 46 **5489.** **H 165.** In 1878 I looked up and measured this pair, and obtained a position-angle of about 100° less than the estimate of Herschel. It was not examined again until 1901, and then the measure appeared to show that the Herschel value was approximately correct. In the following year it was looked for again, and could not be found in or near the assigned place. I have examined all the brighter stars within a radius of one degree several times in the last three years, but down to this time (1905) I have not been able to find this pair, or either of them, if there are two. These are all the observations:

1825	330° ±	3″ ±	1*n*	H	8 ...8
1878.28	205.3	2.59	1*n*	*β*	8.5...8.5
1901.30	330.8	2.16	1*n*	*β*	8.5...8.8

The place given by Herschel, and the one used in setting on this star, is that of the 8.0 m star, DM (12°) 2235. This is a wide pair, the other component being DM (12°) 2234 (9.0). This was measured by Bigourdan as H 165, and the later observation shows no motion.

1880.22	339°.0	55″.85	2*n*	Big
1902.58	337.5	56.08	3*n*	*β*

[*β*1...Big...*β* (*Pop. Ast.* **XI**, 250)...*β*6...]

[Since the foregoing was in type, the mystery of the missing pair has been solved. Hussey's Ninth Catalogue of New Double Stars (*Bul. L. O.* No. 74) has just been issued, and No. 872 of that list is beyond all question the star observed by Herschel, and by me in 1901, both observers making an error of 1^{h} in setting in Right Ascension. This star is DM (12°) 2070 (= Lalande 18903), and the place (1880):

$$\left.\begin{array}{l}\text{R. A.} = 9^{h}\ 31^{m}\ 13^{s}\\ \text{Decl.} = 12^{\circ}\ 25'\ 14''\end{array}\right\}$$

The observations, including recent measures of my own, are as follows:

1825	330° ±	3″ ±	1*n*	H	8 ...9
1901.30	330.8	2.16	1*n*	*β*	8.5...8.8
1905.16	330.7	2.41	2*n*	Hu	9.0...9.5
1905.38	333.1	2.04	2*n*	*β*	8.5...9.0

Doolittle, in searching for the missing pair, finds that the 9.5 m star, DM (12°) 2224, is composed of two nearly equal components. This is $2^{m}\ 35^{s}$ *p* and 17′.9 *s* of DM (12°) 2234, which is the wide pair measured by Bigourdan, the place of which is given in Part I. It is certain that this was measured by me in 1878 for H 165. The following are the measures of this pair:

1878.28	205°.3	2″.59	1*n*	*β*	8.5...8.5
1905.11	201.5	2.49	3*n*	Doo	9.4...9.6
1905.41	204.3	2.35	1*n*	*β*	9.5...9.5

Doolittle finds another pair, about as far south of the equator as this is north, which, curiously enough, corresponds almost exactly in all respects to the description of the other. This new pair is SD (12°) 3222 (9.1), and the place (1880) is:

$$\left.\begin{array}{l}\text{R. A.} = 10^{h}\ 32^{m}\ 9^{s}\\ \text{Decl.} = -12^{\circ}\ 19'.8\end{array}\right\}$$

His measure of this is:

1905.36	335°.0	1″.90	1*n*	Doo	9.0...9.5

This could hardly be the pair observed by Herschel, as his places are given in Polar Distance, and not in Declination.]

5490. **Weisse 24.** Noted "duplex 10″" in W^{2}. This is the pair measured in Ra (XXVII), 55°.5 : 17″.10 : 8.0...9.0, but the angle should be increased 180°. The only other measures are those given from β^{6}. $29^{m}\ 59^{s}$

5491. **β 411.** Discovered with the 6-inch. Change is uncertain. A naked-eye star according to Heis. In Cord. G. C. 6.6 m (*Hydra*). 30 25

1892.28	288°.3	1″.08	3*n*	*β*	6.4...8.2
1892.30	290.6	1.29	4*n*	Lv	6.8...8.5
1898.16	278.8	0.87	1*n*	See	
1902.49	279.4	1.19	3*n*	Doo	

[*β* (**VII**)...*β* (2103, 3141) (*Pub. L. O.* **II**)...Cin4...Cin5...Collins and Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Sellors (3240)...See ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

5492. **ϕ^{2} *Hydrae.*** **β 1075.** Discovered with the 36-inch. Auwers gives the proper motion of the bright star, 0″.065 in the direction of 287°.0. This is nearly in the line of the companion, so that it will soon be a very difficult object if the companion does not have the same movement. The measures point to common proper motion. 30 25

1898.22	283°.1	2″.92	1*n*	See
1899.02	275.3	3.25	2*n*	*β*
1900.12	278.4	2.95	1*n*	A
1901.20	284.2	3.30	1*n*	Doo

[*β* (**XV**)...*β* (2929)...*β* (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...See ( )...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

5493. **OΣ 222.** In 1868, and again in 1871, Dembowski measured an apparent elongation of the principal star, the two measures giving 141°.4 (1869.65). OΣ found this star single in 1877, and it was certainly absolutely round with the 36-inch under the best conditions in 1891. Aitken and Hussey, 1896–1900 found it single with the same instrument. There is no change in the OΣ companion. 30 29

1869.20	345°.5	4″.55	4*n*	*Δ*
1877.32	344.2	4.67	1*n*	OΣ
1896.93	343.8	4.54	3*n*	A
1898.47	342.0	4.35	5*n*	Hu

These stars probably form a physical system, as they have the same proper motion.

Porter	0″189 in 195°1
Kustner	0.205 in 190.3
A. G. Hels.	0.233 in 190.2
Gr. 10-year Catalogue	0.222 in 192.8

[OΣ (IX)(X, p. 194) . . . Δ (I) . . . β (3114) (*Pub. L. O.* **II**) . . . Doolittle (*Pub. Flower Obsy.* I) . . . A (3465) . . . Lewis (*Mon. Not.* **LX**, 501) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . .]

30^{m} 40^{s} **5494.** **H** 4336. "Requires verifying." I could not find this with the 6-inch on a good night in 1874.

30 55 **5496.** Σ 1453. No change since Struve.

1867.27	230°4	8″62	3*n*	Δ
1904.67	230.6	8.87	2*n*	β

[Ma (*F. S.* I) . . . Δ (II) . . . Cin⁵ . . . β⁶ . . .]

31 10 **5500.** OΣ 223 *rej.* Rejected in the *Poulkowa Catalogue* of 1850. Rectilinear motion. The following are all the other measures:

1843.30	160°6	. . . .	1*n*	Ma
1879.25	143.3	19″53	2*n*	β
1898.51	137.6	21.17	3*n*	Hu

[Ma (XI) . . . Δ (I) . . . β³ . . . Hu (*Pub. L. O.* **V**) . . .]

31 30 **5501.** Σ 1454. Perhaps some change in the angle.

1867.87	310°6	3″31	3*n*	Δ
1903.30	315.0	3.00	3*n*	Biesbroeck

[Ma (*F. S.* I) . . . Ma (**XI, XIII, XV**) . . . H (**V**) . . . Δ (II) . . . WS . . . Gl . . . Sp (II) . . . Biesbroeck . . .] (See p. 1073)

31 45 **5504.** **H** 4337. The position-angle is reversed in the later observations.

1878.86	72°1	10″05	3*n*	Cin	8.7 . . . 10.0
1883.50	71.7	10.06	3*n*	W	

[Cin⁴ . . . Cin⁵ . . . Cin⁶ . . . Wilson (Cin¹⁰) . . .]

31 54 **5505.** **H** 5481. Decided change, or error in Herschel's description. No other pair found in the vicinity.

1903.56	103°8	21″42	2*n*	β⁶	9.6 . . . 11.4

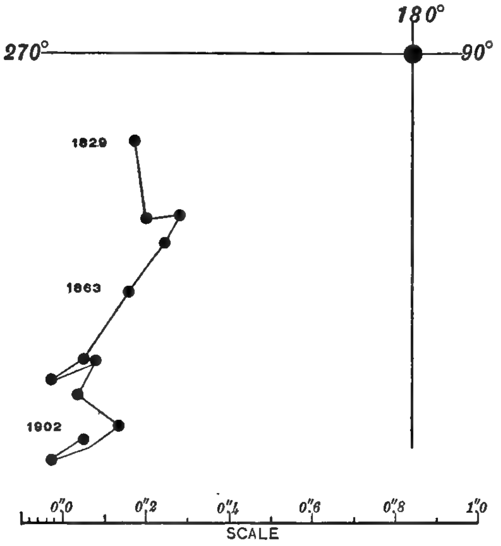
32 7 **5506.** Σ 1456. Fixed.

1867.17	46°3	13″48	3*n*	Δ
1905.18	46.2	13.24	1*n*	β

[Ma (*F. S.* I) . . . Ma (XI) . . . H (IV) . . . Δ (II) . . . Cin⁵ . . . β⁶ . . .]

32 28 **5508.** Σ 1457. The motion so far is practically rectilinear, but some of the measures are very discordant, and it is impossible to decide at this time as to the character of the motion.

1829.55	287°8	0″71	4*n*	Σ
1840.29	302.0	0.76	3*n*	OΣ
1842.24	304.9	0.69	5*n*	Ma
1856.24	307.5	0.76	5*n*	Se
1863.48	310.1	0.90	4*n*	Δ
1865.51	313.1	1.09	4*n*	Δ
1875.37	312.0	1.18	4*n*	Sp
1881.33	314.1	1.07	3*n*	β
1887.28	315.5	1.16	5*n*	Sp
1893.33	321.6	1.15	2*n*	Gla
1898.14	318.4	1.31	3*n*	Hu
1902.37	319.5	1.22	2*n*	A



Σ 1457

[Ma (*F. S.* I) . . . Ma (**IX, X, XI, XIII, XV**) . . . Da³ . . . Wr . . . Se . . . Se² . . . Se³ . . . Se (*Comp. Rend.* **XLVIII**, 375) . . . Hd . . . En (1674, 2663) . . . Bru² . . . Gl . . . WS . . . WS² . . . Sk . . . Sk² . . . Flm . . . Do (2197) . . . Do (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Δ (1185, 1474, 1735) . . . Δ (I, II) . . . OΣ (IX) . . . Sp (2133) . . . Sp (II) . . . Sp (II, App.) . . . Per . . . Per (2684) . . . T (2898) . . . Lv¹ . . . Hl (*Wash. Obsns.* 1886) . . . Hl (I, II) . . . β⁴ . . . Big . . . Maw (I) . . . Collins (*A. J.* 278) . . . Collins (*Proc. Haverford Coll. Obsy.* 1892) . . . Jones (*A. J.* 312) . . . Glasenapp (II) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) . . . Brown (3645) . . . *A. G. Leipzig*, p. 248 . . . HΣ (**XII**) . . . Biesbroeck . . .]

5509. Σ 1458. Relative brightness suspected by Σ to be variable. I found no obvious difference in 1876. Δ gives 8.4 . . . 8.5 No change in position. 32^{m} 45^{s}

1866.47	215°8	17″71	3*n*	Δ
1903.16	214.7	18.04	1*n*	Hu

[Ma (*F. S.* I) . . . Ma (XI) . . . H (V) . . . Δ (II) . . .]

5513. **Hn** 108. (= **Ho** 373.) Ho speaks of a 9m star 237°2 : 49″05. 33 18

1892.78	24°7	0″68	2*n*	Ho	8 . . . 9
1901.15	24.6	0.96	3*n*	Doo	

[Hn (II) . . . Com (VI) . . . Ho (3233) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

5514. Σ 1459. No motion. 33 18

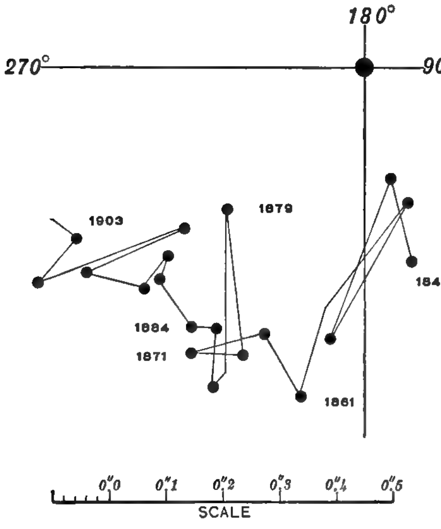
1868.72	152°9	5″21	4*n*	Δ

[Ma (*F. S.* I) . . . Ma (XI) . . . H (V) . . . Se . . . Δ (II) . . .]

(See p. 1073)

$33^m 25^s$ **5515. OΣ 224.** Probably binary, but the measures are very discordant, and the path already described by the companion is very uncertain from the observed positions. The following orbits have been found:

1871	Glasenapp	223.7 yrs.	*Ast. and A.-P.* XII, 702
1871	Glasenapp	144.0	
1892	Gore	96.13	*Ast. and A.-P.* XIII, 502



OΣ 224

It is evident from an inspection of the measures shown on the diagram that it may require another century of measures to give the orbit with any certainty.

1843.22	13°7	0″35	2*n*	Ma
1845.30	13.6	0.20	1*n*	Ma
1851.27	352.6	0.48	1*n*	OΣ
1851.28	17.5	0.25	1*n*	Ma
1861.26	348.8	0.59	1*n*	OΣ
1868.03	339.2	0.5±	4*n*	Δ
1871.31	328.4	0.59	1*n*	OΣ
1872.31	336.8	0.55	1*n*	OΣ
1879.32	315.7	0.35	4*n*	Sp
1880.16	334.3	0.62	1*n*	β
1883.71	330.2	0.53	7*n*	En
1884.21	326.0	0.55	4*n*	Per
1887.27	315.6	0.52	4*n*	Sp
1892.37	313.6	0.48	4*n*	β
1893.22	314.9	0.55	2*n*	Wilson
1893.30	306.0	0.61	2*n*	Lewis
1894.75	311.5	0.43	6*n*	Com
1897.35	303.4	0.69	3*n*	A
1903.27	300.7	0.59	3*n*	Lewis

[Ma (**XI, XIII**)....OΣ (**IX**)....Flm....Do (*Trans. R. I. Acad.* **XXIX**, Part 13) (2330, 2989)...Δ (**I**)...Per...Per (2685)...En (2678)...Sp (**II**)...Sp (**II**, App.) ...β3...β (3142) (*Pub. L. O.* **II**)...β (*Ast. and A.-P.* **X**, 661)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 501; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)...Glasenapp (*Ast. and A.-P.* **XII**, 702) orbit...Wilson ( ) ...Gore (*Ast. and A.-P.* **XIII**, 559) orbit...Com (*Pub. Washburn Obsy.* **X**) ...A (3465)...Hu (*A. J.* 427)...Brown (3645)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**) ...Biesbroeck...]

5516. Σ 1460. Unchanged. $33^m 35^s$

1868.49	165°9	3″23	4*n*	Δ
1889.31	162.9	3.29	4*n*	Giacomelli
1903.26	166.1	3.33	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H1...H2...Se...Wr...Δ (1119)...Δ (**II**)...Gl ...WS...WS2...Sp (**II**)...Ra (**XXVII**)...Du...Knorre (3632)...Giacomelli (**II**)...Biesbroeck...]

5517. Perrotin. (AC = **OΣ 225.**) In 1884 Perrotin found the principal star was a close pair. The later measures show no motion. 33 35

1892.15	241°6	0″78	2*n*	β	8.2...11.2
1896.30	246.8	0.75	1*n*	Lewis	
1897.35	246.1	0.81	3*n*	A	8.2...11.5
1899.27	250.3	0.65	4*n*	Lewis	
1900.28	247.5	0.81	3*n*	Hu	

There is no change in the position of the OΣ star:

1867.26	351°9	6″07	3*n*	Δ
1883.56	353.0	6.41	7*n*	En
1892.15	352.9	6.52	3*n*	β
1898.23	352.7	6.54	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Per...Per (2685)...En (2678)...Sk3...β (3142) (*Pub. L. O.* **II**)...A (3465)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX** 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)...Hu (*Pub. L. O.* **V**)...Do (3930)...]

5519. OΣ 226 *rej.* No measures in OΣ; description from *Poulkowa Catalogue.* The companion was seen by Δ, but not measured. The following are all the complete measures: 33 47

1878.15	58°4	17″89	1*n*	β	...11.8
1899.00	61.1	18.20	3*n*	Hu	
1904.10	59.8	17.92	2*n*	β	

[Ma (**XI**)...Δ (**I**, p. 228)...Sk2...β1...Hu (*Pub. L. O.* **V**)...Sk5...β6...]

5520. H 166. Measures from H (V). 33 53

AB	1902.87	287°0	8″61	2*n*	β^6	9.5...10.3
AC	1902.89	59.7	38.98	1*n*	β^6	...10.0

5522. H 4339. The only measures are: 34 37

AB	1904.11	50°6	41″28	1*n*	β^6	8.6...
BC	1904.11	93.2	5.82	1*n*	β^6	12 ...12

5523. Σ 1461. Fixed. 34 51

1867.10	136°1	8″97	3*n*	Δ

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...] (See p. 1073)

5524. Hd 128. The only later observation is: 35 0

1904.03	267°8	2″65	2*n*	β^6	9.2...10.6

5525. Σ 1464. There is no change in the companion. 35 2

1868.78	301°7	5″19	4*n*	Δ
1903.28	303.4	5.41	2*n*	β

Herschel mentions a 10 m star, 220° : 20″, which is not in Struve, but his distance is much underestimated. The position by Secchi is probably a rough setting.

1856.30	219°4	63″4	1*n*	Se
1903.28	221.9	59.20	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se...Se³...Δ (**II**)...β⁶...]

$35^m\ 22^s$ **5527.** **OΣ 227.** Slow motion in angle.

1843.26	331°5	0″50	3*n*	Ma
1869.67	333.2	0.5±	5*n*	Δ
1884.21	342.7	0.64	4*n*	Per
1887.36	345.1	0.52	3*n*	Hl
1894.76	345.0	0.50	6*n*	Com
1897.31	346.5	0.58	3*n*	Brown
1897.92	344.9	0.65	7*n*	Hu
1903.26	346.3	0.66	3*n*	Lewis

[Ma (**XI, XIII**)...Δ (I)... OΣ (**IX**)...Per...Per (2685)...Hl (**II**)...Com (*Pub. Washburn Obsy.* **X**)....Brown (3645).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIV**, 796)....Hu (*A. J.* 427) (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **II**)...]

35 36 **5528.** **Σ 1462.** Probably unchanged. The principal star is given a proper motion of 0″04 in 0° (*A. G. Harvard*).

1869.25	175°7	8″24	4*n*	Δ
1901.65	172.3	7.77	2*n*	Espin

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Bl (**V**)...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 529)...]

35 46 **5529.** **Σ 1463.** Unchanged.

1868.47	258°8	7″45	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Δ (**II**)...]

(See p. 1073)

35 53 **5531.** **S 611.** The only observation since 1825 is:

1902.18	193°6	59″57	2*n*	β⁵	9.0...9.0

36 2 **5532.** **H 4342.** Another observation, 56°1 : 15″± : 8½...11, and R. A. 1ᵐ more. It is probably Cord. DM (30°) 8653.

R. A. = $10^h\ 37^m\ 6^s$ }
Decl. = −30° 10′ }

36 10 **5533.** **Σ 1465.** Probably without change.

1867.21	11°0	2″06	3*n*	Δ
1871.13	11.2	2.39	5*n*	Du
1903.22	11.4	2.33	2*n*	Do

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Flm....Do (2989, 3930)(*Trans. R. I. Acad.* **XXIX**, Part 13)....Du....Δ (**II**)....Gl....Sk³....Collins (*A. J.* 378)....Lewis (*Mon. Not.* **LX**, 501).....Thiele (3837)....]

36 15 **5534.** **Hn 11.** Comstock could not find this in 1888.

[*Pub. Washburn Obsy.* **II, VI**...]

5535. 40 *Leonis Minoris.* **β 913.** Discovered with the 18½-inch. The distant star, C, was added by Aitken with the 36-inch. The proper motion of the principal star is given: $36^m\ 26^s$

Auwers	0″137 in 248°1
Porter	0.131 in 246.2

This appears to explain the change in the small star.

A and B

1892.14	119°9	12″27	3*n*	β
1898.34	119.3	12.85	3*n*	A
1899.02	118.1	13.10	1*n*	β

A and C

1898.31	77°3	39″71	1*n*	A	...14

A and D

1899.02	275°9	55″75	1*n*	β	...13.5

[β (**XIII**)...β³...β (*Ast. Reg.* **XVIII**, 140)...β (3142) (*Pub. L. O.* **II**)...A (3584)...]

5537. From Δ (I, p. 379). Though widely separated, these stars have a large common proper motion. This is given by Porter: 36 29

A = 0″334 in 259°5
B = 0.334 in 260.0

5539. 35 *Sextantis.* **Σ 1466.** (= **H N.** 36 = **Sh** 116.) Fixed. This star has no appreciable proper motion. 37 7

1865.90	239°8	6″62	3*n*	Δ
1889.29	240.2	6.65	5*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...H¹...H²...Da¹...Da³...Bp...Ba (**II, III**)...Bru...Se...Se²...Se³...Wr...Δ (1205)...Δ (**I, II**)...Du...Pl...Bru²...Je (2347)...Ra (**XXI, XXII, XXXVIII, XXXIX**)...Per...Per (2684)...Hl (**I, II**)...Glasenapp (**II, III**) ... *A. G.Leipzig*, p. 248... *Annals Toulouse Obsy.* **III** ...Giacomelli (**II**)...]

5540. **Hn 109.** No other measures. 37 21

[*Pub. Washburn Obsy.* **II, VI**...]

5541. **H 2543.** "A third 15 m 15″ *sp.*" The magnitude of the principal star in DM is 9.1. My estimates of the distant star are, 240° : 20″. 37 23

1879.25	34°8	2″83	1*n*	β³	9.0...9.5

5544. **Σ 1468.** Fixed. 38 11

1869.23	333°5	3″91	4*n*	Δ
1902.36	332.8	4.04	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...]

5545. **Σ 1467.** Unchanged. 38 13

1867.90	291°6	4″03	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XII**)...Gl...Δ (**II**)...]

(See p. 1073)

5546. **Ho 532.** The only other measures are: 38 25

1903.01	321°7	1″26	4*n*	Doo

[Ho (3557)...]

39m 1s **5548.** 42 *Leonis Minoris.* **S 612.** (= σ 366.) The principal star has a proper motion of 0″.049 in 249°.8 (Auwers). The small star is DM (31°) 2181. The meridian positions give:

1872	172°.7	199″.85		*A. G. Leiden*
1905.28	172.9	199.29	1*n*	β^6

39 5 **5549.** **H 836.** H (V) 11°.3 : 3′± : 13...14 (1830+).

39 11 **5550.** **Σ 1455.** Seen but not measured by Dembowski. The principal star is probably Redhill 1590. No material change.

A and BC	1896.43	246°.0	33″.75	3*n*	A
B and C	1896.43	348.6	1.95	3*n*	A

[Ma (*F. S.* I)...Δ (1736)...A (3395)...]

39 42 **5551.** **Σ 1469.** Fixed. The principal star has a proper motion of 0″.104 in 270° (Schroeter).

1867.76	323°.2	10″.88	3*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...]

39 46 **5552.** **β 914.** Discovered with the 18½ inch.

1894.24	337°.8	1″.46	2*n*	W	7.7...12.0
1904.11	332.3	1.38	3*n*	Doo	

[β (**XIII**)...β^3...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **II**)...]

40 1 **5555.** **Hn 110.** Discovered by Holden; measures by Comstock.

1898.3	274°.6	2″.42	1*n*	See

[*Pub. Washburn Obsy.* **II**, **VI**...Innes (*Catalogue of Southern Doubles*)...]

40 9 **5556.** **Σ 1470.** Probably no change. The following are all the other measures:

1844.29	8°.5	1″.75	1*n*	Ma
1867.99	6.2	1.17	2*n*	Δ
1878.57	9.5	1.33	3*n*	Cin
1884.26	10.9	1.37	1*n*	Wilson
1893.33	15.1	1.19	1*n*	Gla
1900.30	12.5	1.51	2*n*	Lunt

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin6...Wilson (Cin10)...Glasenapp (**II**)...Lunt (*Mon. Not.* **LXI**, 591)...]

40 39 **5557.** **Σ 1472.** (= OΣ (App) 106.) Rectilinear motion. The most probable value of the proper motion of A from the seven sets of measures is 0″.054 in 206°.3.

1828.55	39°.6	33″.74	4*n*	Σ
1843.73	39.2	34.51	5*n*	OΣ
1864.93	38.6	35.46	6*n*	Δ
1878.62	38.5	36.14	3*n*	OΣ
1885.85	38.6	36.91	4*n*	Per
1898.23	37.9	37.56	3*n*	Doo
1903.02	38.4	37.46	3*n*	β

[Ma (*F. S.* **II**)...OΣ (**IX**)...OΣ (**X**, pp. 22, 164)...Δ (1572)...Δ (**II**)...Do (3930)...En...Flm...Per...Per (2748)...Sk3...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

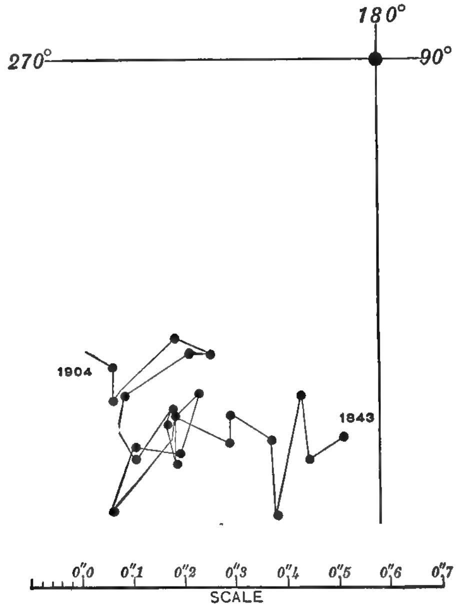
5558. **OΣ 228.** There is no satisfactory evidence of change since 1851. These stars have a proper motion of 0″.124 in 270° (*A. G. Berlin*). 40m 46s

1869.22	196°.1	Obl	5*n*	Δ
1875.35	193.2	0″.4±	4*n*	Sp
1879.37	194.8	0.34	3*n*	Hl
1884.21	191.8	0.53	3*n*	Per
1887.36	194.2	0.48	3*n*	Hl
1893.38	198.6	0.77	2*n*	Lewis
1898.37	191.8	0.59	3*n*	Hu
1903.28	189.9	0.41	2*n*	Bowyer

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**II**)...Sp (2133)...Sp (**II**)...Per...Per (2685)...En (2678, 2786)...Ho (2978)...Hl (**I, II**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 501; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796)...Flm...Brown (3645)...Hu (*Pub. L. O.* **V**.)..HΣ (**XII**)...Biesbroeck...]

5559. **H 4365.** "The first of three stars in an equilateral triangle." Companion not seen with 6-inch, but poor conditions (1876). 40 48

5560. **OΣ 229.** Very slow motion in angle. The measures are very discordant, and indicate nothing as to the character of the motion. The diagram shows other measures than those cited. 41 8



OΣ 229

1846.55	347°.0	0″.68	5*n*	OΣ
1859.84	344.2	0.78	4*n*	OΣ
1867.78	337.4	0.76	3*n*	Δ
1872.05	338.7	0.81	4*n*	Du
1879.29	331.9	0.75	3*n*	Hl
1884.21	330.1	0.83	2*n*	Per
1888.32	328.7	0.92	3*n*	Hl
1893.31	327.3	0.69	2*n*	Gla
1894.75	324.0	0.68	6*n*	Com
1897.37	322.5	0.85	3*n*	Brown
1904.21	319.3	0.80	2*n*	Biesbroeck

[Ma (**XI, XIII**) ... OΣ (**IX**) ... OΣ (**X**, p. 194) ... Da³ ... Flm ... Du ... Do (2989) (*Trans R. I. Acad.* **XXIX**, Part 13) ... Sk³ ... Big ... Sp (**II**) ... Δ (I) ... Per ... Per (2685) ... En (2678) ... Hl (I, II) ... Glasenapp (**II**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 796) ... Maw (**II, IV**) ... Big (*Bul. Ast.* **XII**, 299) ... Com (*Pub. Washburn Obsy.* **X**) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ... Do (3930) ... Biesbroeck ...]

41^{m} 33^{s} **5561.** **H 837.** H (v) 340°0 : 12″ ± : 9–10 ... 11–12. In DM 9.1m.

41 43 **5562.** **Σ 1473.** (= **S 613.**) Fixed.

1867.56	10°5	30″69	3*n*	Δ

[Ra (**XXIII**) ... Ma (*F. S.* **II**) ... En ... Δ (**II**) ...]

41 43 **5563.** **Σ 1474.** (= **H II. 74** = **S 614.**) No material change.

A and B

1867.12	22°8	70″53	2*n*	Δ
1879.33	22.5	69.76	1*n*	Sp
1888.31	23.8	70.63	2*n*	T

B and C

1867.20	198°0	6″58	3*n*	Δ
1880.68	197.3	6.54	3*n*	Sp
1888.31	195.2	6.67	2*n*	T

[Ma (*F. S.* I) ... Ma (**XIII, XV**) ... H² ... H (**VIII**) ... Da² ... Ra (**XXIII, XXIV**) ... Se ... Se³ ... Gl ... WS ... WS² ... Cin³ ... Cin⁵ ... Cin⁶ ... Wilson (Cin¹⁰) ... Sp (**II**) ... Δ (1205) ... Δ (I, **II**) ... T (2991) ... Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LXIV**, 52) ... Do (3799) ... Biesbroeck ...]

42 1 **5564.** **H 2545.** "Fine double star."

1902.27	111°1	18″96	3*n*	Espin	8.8 ... 11.2

[Espin (*Mon. Not.* **LXII**, 532) ...]

42 9 **5565.** **β 595.** Discovered with the 18½-inch. Probably without change.

1879.20	17°8	2″00	1*n*	β	8.5 ... 10.0
1880.26	18.1	1.95	1*n*	Pt	
1884.99	13.0	1.95	3*n*	W	8.1 ... 10.5
1898.26	12.4	2.24	3*n*	A	9.0 ... 10.5
1901.30	16.9	2.25	4*n*	Doo	

[β (**X**) ... β¹ ... β³ ... Cin⁵ ... Wilson (Cin¹⁰) ... Pt ... A (3584) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

42 18 **5566.** **S 615.** The only later position is:

1896.43	1°1	86″34	2*n*	A	9+ ... 9+

[A (3395) ...]

42 32 **5567.** **Σ 1475** *rej.* Measures by β⁶.

43 0 **5569.** **Σ 1471.** Fixed.

1868.29	2°9	1″90	3*n*	Δ
1896.49	0.1	2.06	3*n*	A

[Ma (*F. S.* I) ... Δ (**II**) ... A (3395) ...]

43^{m} 3^{s} **5570.** *Leonis* 222. **β 596.** Discovered with the 18½-inch. Probably unchanged. Lalande 20827.

1886.22	274°7	2″96	2*n*	HΣ
1891.28	278.6	2.56	3*n*	β
1903.21	282.9	1.94	1*n*	Lewis
1904.13	276.0	2.57	3*n*	Doo

[β (X) ... β¹ ... β (3114) (*Pub. L. O.* **II**) ... HΣ (**XII**) ... Lewis (*Mon. Not.* **LXIV**, 796) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

43 8 **5571.** **Ho 374.** Discovered with the 18½-inch.

1903.32	268°9	2″97	3*n*	Doo

[Ho (3233) ...]

43 12 **5572.** **Σ 1476.** Some angular motion is shown, with little or no change in distance. This is 40 *Sextantis.*

1832.61	353°7	1″89	3*n*	Σ
1842.24	353.5	1.70	3*n*	Ma
1868.79	357.4	1.94	4*n*	Δ
1877.35	359.2	2.16	4*n*	Sp
1885.84	0.6	2.18	2*n*	Per
1893.33	1.6	2.02	2*n*	Gla
1903.14	0.8	2.19	5*n*	Jouffray

[Σ¹ ... H¹ ... H² ... Ma (*F. S.* I) ... Wr ... Se ... Se³ ... Hd ... Flm ... OΣ (**IX**) ... Ma (**X**) ... WS ... WS² ... Gl ... Ferr ... Sp (**II**) ... Pt ... Per ... Δ (I, **II**) ... Lv¹ ... Cin⁵ ... Wilson (Cin¹⁰) ... Lewis (*Mon. Not.* **LIV**, 316; **LX**, 502) ... Glasenapp (**II**) ... Lunt (*Mon. Not.* **LXI**, 591) called 40 *Sextantis* ... Do (3799) ... Scott (*Mon. Not.* **LXIV**, 52) ... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

43 13 **5573.** **β 915.** Discovered with the 18½-inch. Apparently without change. Near Σ 1478.

1896.52	231°2	1″26	2*n*	A
1901.30	230.2	1.47	4*n*	Doo
1903.33	231.7	1.34	2*n*	Bowyer

[β (**XIII**) ... β³ ... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... A (3395) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIV**, 796) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

43 17 **5574.** **Σ 1477.** (= **H 168.**) Unchanged.

1866.78	274°9	17″43	3*n*	Δ

[Ma (*F. S.* I) ... Ma (**XI**) ... En ... Δ (**II**) ... *A. G. Leipzig*, p. 208 ...]

44 17 **5575.** 41 *Sextantis.* **H 838.** The large star has a proper motion of 0″018 in 243°7 (Auwers). The only measures are:

AB	1878.18	303°8	26″95	1*n*	β	
	1901.32	303.0	27.05	2*n*	β	6 ... 11.7
AC	1879.34	72.4	233.45	2*n*	β	

[β¹ ... β³ ... β⁵ ...]

44 33 **5576.** **Σ 1478.** Fixed.

1867.57	348°8	8″83	3*n*	Δ
1880.37	348.2	8.60	1*n*	β

[Ma (*F. S.* I) ... Ma (**XI, XIII, XV**) ... Da³ ... Hd ... Gl ... WS ... WS² ... Δ (**II**) ... β³ ...]

45^{m} 11^{s} **5579.** **β** 111. Discovered with the 6-inch. Without change.

1880.66	6°3	3″59	2*n*	β	9.0...9.3
1884.57	5.0	3.65	3*n*	W	9.0...9.3
1888.24	5.4	3.51	5*n*	Lv	9.4...9.5
1898.25	4.6	3.52	3*n*	A	9.0...9.0

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^{3}...Δ (**I**)...LM...Lv^{1}...Wilson (Cin^{10}) ...Pt...A (3584)...]

45 25 **5580.** **Ho** 375. A later position is:

1905.05	174°8	11″86	3*n*	Doo

[Ho (3233)...]

45 47 **5581.** The principal star is very red. Measures by β^{6}. No other observations.

45 51 **5582.** Δ 14. (AC = **Σ** 1481.) The nearest companion was discovered by Dembowski in 1864. These stars appear to be relatively fixed.

A and B

1878.27	194°1	6″02	2*n*	β
1904.29	196.5	5.92	2*n*	β

A and C

1864.61	343°1	29″66	3*n*	Δ
1904.29	344.0	29.74	2*n*	β

[Ma (*F. S.* **II**)...Δ (1572)...Δ (**II**)...β^{1}...β^{6}...]

45 55 **5583.** **Σ** 1482. (= **S** 616.) Fixed.

1866.88	305°5	11″61	3*n*	Δ
1893.33	305.1	11.59	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Se...Ra (**XXIII**)... H (**V**)... Δ (**II**) ... Hl (*Wash. Obsns.* 1863)...Hl (**I**, p. 131)...Glasenapp (**II**)...]

46 11 **5584.** **Ho** 376. Discovered at the Dearborn Observatory.

1903.32	216°0	2″35	3*n*	Doo

[Ho (3233)...]

47 6 **5587.** **H** 2547. Nothing since Herschel but the following:

1880.29	65°5	27″25	1*n*	Big	9...10

47 8 **5588.** **Weisse** 25. "Duplex" in W^{1} No near companion on one occasion with the 6-inch, 1875, and found to be single on two nights with the 40-inch in 1902–3.

47 19 **5590.** **S** 617. (= σ 370.) This is the same as No. 6 of the list of new pairs in Ma (XI), but the place given by Ma is about 1^{m} *p* and 9′ *n* of the correct position. Glasenapp notes it as single, probably looking for a close pair only. The proper motion of each star is 0″130 in 230°1 (*A. G. Nico*). The following are all the subsequent measures:

1843.29	177°7	35″46	1*n*	Ma	7 ...8
1880.66	178.6	35.09	3*n*	Sp	
1901.18	178.0	35.33	2*n*	β	6.6...8.5

[Ma (**XI**)...Sp (**II**)...Glasenapp (**II**)...β^{5}...]

5591. **A** 132. No other measures. 47^{m} 20^{s}

[A (3741) (*Bul. L. O.* No. 3)...]

5592. **Σ** 1483. Probably unchanged. 47 30

1868.25	248°0	2″98	3*n*	Δ
1903.02	246.7	3.12	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...]

5593. *b*^{3} *Hydrae.* (BC = **Ho** 533.) The distant double companion was noted with the 6-inch in 1873, and estimated as given. The large star has a considerable proper motion, 0″237 in 165°9 (Porter). The change in AB is explained by this movement. No change in BC. A faint star between A and B. 47 37

A and B

1886.78	208°4	135″34	2*n*	Eng
1894.25	209.2	134.58	2*n*	Eng
1904.31	210.3	132.91	2*n*	β

B and C

1890.36	131°3	13″42	2*n*	Ho	9...10
1904.31	132.1	13.79	2*n*	β	

[Engelhardt (**II**, **III**)...Ho (3557)...β^{6}...]

5594. **Ma** 5. This is No. 7 of the list of new pairs in Ma (XI). The place there is 0^{m}4 *f*, and 2′ *s* of No. 6, which is identical with S 617 (No. 5590). There is no star in this place. The nearest is B. A. C. 3732, which is 18^{s} *f* and 7′16″ *n* of S 617, and that is undoubtedly the star referred to by Madler. I have examined this a number of times, particularly with the 18½-inch in 1878, and with the 36-inch in 1891, without seeing any trace of duplicity. It has not been seen double by any one since Madler, and it is probable that his observation is in error. 47 38

[β (3114) (*Pub. L. O.* **II**)...Glasenapp (**II**)...]

5595. **Σ** 1484. In 1866 Dembowski found it too faint to measure. The change is evidently due to proper motion. The positions by Σ and β give 0″050 in 214°9 for the movement of A. The following are all the measures: 47 40

1832.32	338°5	11″95	2*n*	Σ
1844.38	341.7	12.82	1*n*	Ma
1903.17	350.6	14.25	4*n*	β

The 40-inch shows a third star:

B and C

1903.22	265°0	12″79	1*n*	β	...13.5

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1736)...β^{6}...]

$47^m 52^s$ **5597.** **Σ 1486.** *Yellow : blue*, H. Change is uncertain.

1867.68	102°.3	29″.09	4*n*	Δ
1881.24	102.1	29.50	2*n*	Big
1900.59	101.6	28.86	2*n*	Espin

[Ma (*F. S.* **II**) ... H^1 ... Flm ... Δ (1800) ... Δ (**II**) ... Big ... Sk^3 ... Espin (*Mon. Not.* **LXII**, 529) ...]

48 5 **5599.** **OΣ 230.** Angle slowly increasing.

1843.30	4°.6	9″.60	2*n*	Ma
1867.27	11.2	8.27	3*n*	Δ
1878.24	13.4	8.36	1*n*	β
1891.34	15.1	8.37	2*n*	HΣ
1898.43	16.7	8.49	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Flm ... Δ (**I**) ... β^1 ... En (2678) ... Pt ... Doolittle (*Pub. Flower Obsy.* **I**) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ...]

48 20 **5600.** **β 597.** Discovered with the 18½-inch. Probably unchanged.

1894.24	46°.2	0″.79	3*n*	W
1901.64	40.6	0.75	4*n*	Doo
1904.31	43.8	0.66	1*n*	A

[β (**X**) ... β^1 ... Wilson (   ) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

48 40 **5601.** **H 2548.** "A fourth 10 m nearly in a line."

49 7 **5603.** 54 *Leonis.* **Σ 1487.** (= **♅ III. 30 = Sh 117.**) Probably a little change in the angle, but the motion is very slow. The large star has a proper motion of 0″.089 in 277°.7 (Auwers).

1840.61	103°.5	6″.34	4*n*	OΣ
1847.68	104.3	6.22	6*n*	OΣ
1860.34	104.6	6.40	5*n*	OΣ
1869.20	104.7	6.31	4*n*	Δ
1875.72	104.6	6.27	5*n*	Sp
1885.85	107.4	6.43	6*n*	Hl
1903.28	107.5	6.38	3*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (324) ... Ma (**IX, XI, XIII, XV**) ... Da^3 ... Wr ... Bp ... Ba (**II, III**) ... Lu (**II, III**) ... Se ... Se^3 ... Hd ... *Durham Obsns.* 1846–48 ... Ra (**XXII, XXXIX**) .... Do (2197, 2199, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Nobile (*Rend. della R. Accad. Sci.*, Dec. 1877) .... Du .... Δ (*Mem. Accad. Sci.*) ... Δ (1031, 1209) ... Δ (**I, II**) ... WS ... Gl ... Sk^2 ... Pl ... Flm ... Sp (2133) ... Sp (**II**) ... Per ... Per (2684) ... Pk ... Hl (*Wash. Obsns.* 1886) ... Hl (**I, II**) ... Je (2347) ... T (2866) ... En (2663) ... Big ... Jones (*A. J.* 312) ... Maw (**I**) ... Glasenapp (**II, III**) .... Collins (*A. J.* 378) .... Ho (3558) .... Giacomelli (**II**) .... Bryant (*Mon. Not.* **LX**, 502) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Thiele (3837) ... Bowyer (*Mon. Not.* **LXIII**, 403) .... Sk^5 ... Biesbroeck ...]

49 29 **5604.** **O. Stone 20.** No other measures:

[Wilson (Cin^{10}) ...]

49 32 **5605.** 55 *Leonis.* **β 1076.** Discovered with the 36-inch. Auwers gives the proper motion of this star 0″.086 in the direction of 84°.7. This movement belongs to the small star as well. The following are all the later measures:

1898.22	35°.0	0″.88	3*n*	A
1899.12	31.7	0.82	1*n*	A

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... A (3584, 3638) ...]

5606. **H 111.** No other measures. Probably this star is SD (17°) 3257. $49^m 38^s$

[*Pub. Washburn Obsy.* **II, VI** ...]

5607. **Σ 1488** *rej.* The magnitude in DM is 7.5. This star has a proper motion of 0″.058 in 301°.0 (*A. G. Harvard*). 49 39

5608. **Σ 1479.** Probably unchanged. 49 58

1867.88	22°.2	4″.64	3*n*	Δ

[Ma (*F. S.* **I**) .... Ma (**XIII**) .... Δ (**II**) .... Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Cin^5 ...]

5609. **H 491.** H (V) 120°.4, but erroneously called H 490. 50 1

5610. 57 *Leonis.* **♅ V. 62.** (= **σ 372.**) Certainly a mistake in the place. I have examined this several times under favorable conditions, and there is no such companion. The star referred to by ♅ is probably S 617 (No. 5590), but the absence of the angle makes it impossible to identify it positively. S 617 is the nearest bright pair corresponding in distance. 50 1

5611. **Hu 726.** Since Part I was in type, this has been measured: 50 2

1904.82	292°.4	1″.48	2*n*	Hu	9.1...13.0

[Hu (*Bul. L. O.* No. 65) ...]

5613. **Σ 1489** *rej.* From *Catalogus Novus*, Cl. III and IV. Mentioned in H (V), but no measures. The pair referred to by Herschel is Σ 1490 *rej.* There is no other pair or triple in this immediate vicinity The R. A. in *Catalogus Novus* is the same as that of Σ 1490 *rej.* and Decl. 1′ more. 50 14

5614. **Σ 1490** *rej.* Since Part I was in type I have identified this as DM (18°) 2422. This star is given a proper motion of 0″.043 in 226°.3 (*A. G. Berlin*). 50 14

1905.17	100°.4	17″.35	2*n*	β^6	8.3...10.5

5615. **S 618.** These stars are SD (20°) 3299 and 3300. This is the only observation since South: 50 17

1903.29	36°.6	78″.98	3*n*	β^6	8.5...8.6

5618. **Σ 1493** *rej.* Nothing since Struve but the following: 51 13

1905.18	356°.4	24″.98	1*n*	β^6	8.3...11.0

5620. **Σ 1491.** Unchanged. 51 18

1867.89	31°.6	13″.80	3*n*	Δ
1905.33	32.7	13.84	1*n*	β

[Ma (*F. S.* **I**) ... Bl (**V**) ... Δ (**II**) ... β^6 ...]

51^m 38^s **5622.** **Hu** 637. No other measures.

[*Bul. L. O.* No. 57...]

51 45 **5623.** Σ 1494. Unchanged.

1866.54	330°.1	9″.87	3*n*	Δ
1879.24	332.5	10.12	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...β3...]

51 59 **5624.** Σ 1496. Probably unchanged.

1866.27	352°.4	18″.78	3*n*	Δ
1881.33	352.3	19.39	3*n*	Sp
1893.26	353.1	19.20	1*n*	Leip

[Ma (*F. S.* **II**)...Ma (**XIII, XV**)...H (**V**). . Hd...Δ (1205)...Δ (**II**)...WS...Gl...Sp (**II**)...*A. G. Leipzig*, p. 208...]

52 22 **5625.** Σ 1497 *rej.* From *Catalogus Novus*. The only measure is:

1895.40	71°.2	17″.49	1*n*	*A. G. Leip.*, p. 248	9.4...9.6

52 28 **5627.** Σ 1495. (= **H** V. 111 = **H** N. 97 = **Sh** 118.) *Red: blue*, H (IV). Fixed.

1866.67	38°.1	34″.53	3*n*	Δ
1893.36	38.0	34.62	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...OΣ (**X**, pp. 23, 204)...Bl (**V**)...Δ (**I**, p. 412)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...En (2662)...Glasenapp (**II**)...Hl (**I**)..Espin (*Mon. Not.* **LXII**, 529)...]

52 33 **5628.** **H** 4389. "Double, Cl. II" in *Cordoba Zones*.

53 22 **5629.** **A. G.** 172. "Double" in *A. G. Berlin*, but single, 1903, Miller (*A. J.* 546).

53 25 **5630.** **A** 133. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

53 40 **5631.** **Ho** 46. Probably unchanged.

1899.39	98°.7	2″.69	2*n*	A	10.5...10.5
1903.30	277.3	1.95	3*n*	Doo	

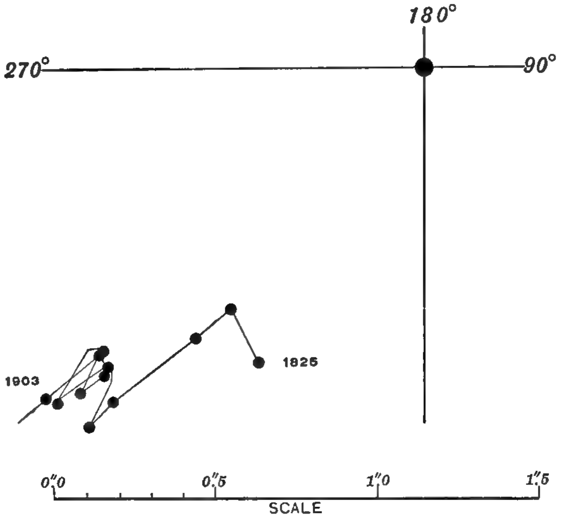
[Ho (2778, 3558)...A (3639)...]

53 49 **5632.** Σ 1498 *rej.* There is a companion nearer than the one observed by H.

1905.33	AB	11°.7	7″.82	1*n*	β6	8.0...10.7
1905.33	AB	291.8	28.91	1*n*	β6	10.8

5633. Σ 1500. There appears to be some change, but the measures are too discordant to decide whether the motion is orbital or rectilinear. 53^m 55^s

1825.22	330°.9	1″.06	2*n*	Σ
1832.09	321.5	0.97	4*n*	Σ
1840.30	320.2	1.11	2*n*	OΣ
1867.27	317.3	1.43	3*n*	Δ
1871.31	317.3	1.53	1*n*	OΣ
1878.35	313.7	1.36	2*n*	Hl
1885.84	312.8	1.55	2*n*	Per
1886.41	311.9	1.34	2*n*	Hl
1894.67	313.8	1.48	5*n*	Com
1897.32	314.2	1.39	2*n*	Brown
1902.36	311.8	1.36	3*n*	A
1903.36	311.6	1.57	3*n*	Hu



Σ1500

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Bp...Se...Se3...Se (*Comp. Rend.* **XLVIII**, 375)....Da3....Da4....OΣ (**IX**)....Ba (**II, IV**)....Δ (1205, 2194)....Δ (**I, II**)....Do (2197, 2307, 3799)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Gl...WS...WS2...Pt...Sp (2133)...Sp (**II**)...Per...Hl (*Wash. Obsns.* 1886)...Hl (**I, II**)...Cin5...Cin6...Wilson (Cin10)...En (2663)...Tebbutt (*Mon. Not.* **L**, 23)...Maw (**II, III**)...Lewis (*Observatory* **XIX**, 118)...Com (*Pub. Washburn Obsy.* **X**)...Doolittle (*Pub. Flower Obsy.* **I**)...Brown (3645)...Bryant (*Mon. Not.* **LX**, 502)....Lunt (*Mon. Not.* **LXI**, 592)....Jouffray (*Bul. Ast.* **XXI**, 299)...Biesbroeck...]

5634. **A** 134. No other measures. 54 0

[A (3741)(*Bul. L. O.* No. 3)...]

5635. **O. Stone** 21. Discovered at the Cincinnati Observatory. 54 18

[Cin4...Cin6...]

5637. **A. G.** 173. Double in *A. G. Albany*. Measures by Miller (*A. J.* 554). 54 22

54m 32s **5639.** 59 *Leonis.* **β 598.** Discovered with the 18½-inch. The proper motion of 59 *Leonis* is 0″.085 in the position-angle of 270° (Auwers). The later measures are:

1892.12	221°.2	46″.05	3*n*	β	5.7...13.4
1898.26	221.3	46.40	2*n*	A	5.5...14.0
1898.96	220.5	46.83	1*n*	β	
1901.28	221.6	46.49	3*n*	Doo	

[β (**X**)....β1....β (3142) (*Pub. L. O.* **II**)....A (3584)....Doolittle (*Pub. Flower Obsy.* **II**)....]

54 40 **5640.** **H 1181.** "Large star scarlet, almost blood color; a most intense and curious color." This is No. 138 Schjellerup's *Catalogue of Red Stars*; and is also *R Crateris* of the variable star catalogues. B is O. Arg. S. 11044. The only measures are:

1866.36	268°.5	65″.99	3*n*	Kn	8.3...9.8

54 48 **5641.** **Weisse 26.** Description from W². I found the angle about 180° (1876).

55 42 **5644.** **Σ 1502.** (= **H 170.**) No material change.

1867.10	284°.5	12″.59	3*n*	Δ
1903.64	284.4	12.88	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Δ (**II**)...WS...Gl...Glasenapp (**II**)...]

55 44 **5645.** **Σ 1501.** No change.

1868.22	186°.0	1″.90	3*n*	Δ
1903.29	187.4	1.81	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Bryant (*Mon. Not.* **LX**, 502)...]

55 55 **5646.** **Σ 1503.** (= **H 171.**) Probably fixed.

1867.46	269°.7	11″.17	3*n*	Δ
1903.29	269.9	11.52	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...*A. G. Leipzig*, p. 208...]

55 55 **5647.** **H 172.** This and H 171 (Σ 1503) are very much alike but are different stars.

55 56 **5648.** **H 2553.** "No description." Found and estimated, 270°: 10″: 10...11 (1876). The magnitude in DM is 9.5.

56 12 **5650.** **H I. 77.** The measures of this pair are all of recent date. Probably without change. Since Part I was in type, I have identified this as Lalande 21178, the place of which is:

R. A. = 10h 56m 9s
Decl. = −15° 2′ 46″

1876.08	16°.2	2″.92	2*n*	Cin	
1883.58	18.9	2.97	6*n*	En	8.0...8.4
1888.54	16.5	2.91	3*n*	Lv	8.0...8.1
1903.36	16.0	2.90	2*n*	Scott	
1905.24	20.2	2.48	1*n*	β	

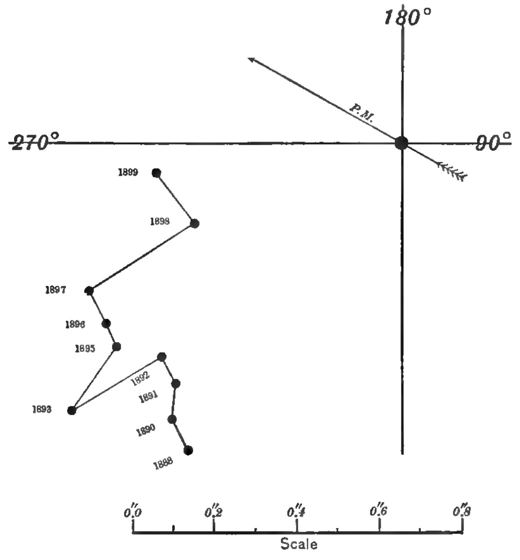
[Cin3...Cin5...Cin6...Wilson (Cin10)...Lv1...Do (2989) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Sp (**II**)...Big...En (2678)...Scott (*Mon. Not.* **LXIV**, 52)...β6...]

5651. **Ho 47.** No motion. 56m 18s

1899.40	139°.5	0″.72	2*n*	A	9.4...9.4
1904.00	145.2	0.72	3*n*	Doo	

[Ho (2778, 3558)...A (3639)...Lewis (*Mon. Not.* **LXIII**, 403)...]

5652. α *Ursae Majoris.* **β 1077.** This interesting system was discovered with the 36-inch. The measures at Mt. Hamilton were sufficient to show that it was a binary, since the proper motion of the principal star would have been apparent, after a short interval, in the changed position of the companion. Auwers (*Fundamental Catalogue*) gives the proper motion of α *Ursae* as 0″.149 in the direction of 240°.2, and it was evident at the time it was first seen double that the companion had the same movement in space, as otherwise it would have been recorded as a double star long before. The orbital motion is retrograde, and thus far about 3°.5 per year. With a much nearer approach it will be difficult, if not impossible, to measure with the largest instruments now in use. 56 19



α **Ursae Majoris** β**1077**

The principal positions are shown on the accompanying diagram.

The following are all the measures:

1889.19	326°.1	0″.91	4*n*	β
1890.26	320.1	0.87	4*n*	β
1890.53	316.7	0.81	3*n*	HΣ
1891.30	316.8	0.80	4*n*	β
1892.11	311.5	0.78	3*n*	β
1893.49	308.9	1.03	2*n*	Bar
1895.25	305.5	0.85	1*n*	Com
1896.30	301.4	0.84	2*n*	Com
1897.81	295.4	0.84	1*n*	β
1898.35	291.1	0.54	1*n*	β
1899.18	276.8	0.6±	1*n*	A

There is a small star 384″.95 distant from α in the direction of 203°.5 (1881.12) which has nearly the same proper motion, 0″.222 in 232°.5.

[β (**XV**)....β (2891, 2929, 2979, 3048, 3114, 3142)....β (*Knowledge*, July 1891)....β (*Pub. L. O.* **II**)...Com (*Pub. Washburn Obsy.* **X**)...Barnard (*A. J.* 447)...HΣ (**XII**)...A (*Bul. L. O.* No. 11)...] (See p. 1073)

$56^m\ 31^s$ **5653.** **H 173.** "The small star is the *minimum visibile*." In W¹ 8 m.

57 28 **5656.** **Howe 25.** Discovered by Howe at Cincinnati.

1903.35	335°0	2″10	2*n*	Scott

[Cin¹...Cin⁴...Wilson (Cin¹⁰)...Lv¹...Scott (*Mon. Not.* **LXIV**, 52)...]

57 31 **5657.** **Ho 48.** Measures discordant, but probably no change.

1895.32	357°4	1″09	1*n*	Ho
1901.23	12.1	1.46	1*n*	Lewis
1904.19	5.9	1.60	7*n*	Doo
1904.33	3.6	1.66	2*n*	A

[Ho (2778, 3558)...Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIV**, 797)..]

57 36 **5658.** **Ho 49.** The later measures are:

1895.32	355°3	7″25	1*n*	Ho
1900.35	353.4	7.51	5*n*	Doo

[Ho (2778, 3558)...Doolittle (*Pub. Flower Obsy.* **I**)...]

57 48 **5659.** **Σ 1504.** Probably slow direct motion in angle, with no sensible change in distance.

1843.29	280°1	0″92	6*n*	Ma
1866.67	283.4	1.11	5*n*	Δ
1875.37	286.3	1.16	4*n*	Sp
1878.33	284.0	1.13	2*n*	Hl
1881.26	287.1	1.17	4*n*	Je
1888.28	286.1	1.10	3*n*	Hl
1893.35	290.4	1.10	2*n*	Lewis
1903.64	288.8	1.17	3*n*	Hu

[Ma (*F. S.* **II**)....Ma (**X, XI, XIII, XV**)....Se....H (**IV, V**)....En (1674).... OΣ (**IX**)...WS...WS²...Gl...Do (2303)...Flm...Sk²...Per.. Per (2684)...T (2898)...Lv¹...Je (2449)...Δ (1205, 1800)...Δ (**I, II**)...Sp (2133)... Sp (**II**)...Hl (**I, II**)...β³...Big...Glasenapp (**II**)...Brown (3645)...A (3639)....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 502; **LXI**, 486; **LXIV**, 796)...Sk⁵...Coleman (*Mem. R. A. S.* **LIV**)...]

57 51 **5660.** 51 *Ursae Majoris.* **Ho 377.** No motion.

1899.29	249°4	8″35	1*n*	A
1903.27	247.1	8.24	3*n*	Doo

[Ho (3233, 3558)...A (3639)...]

57 59 **5661.** **Σ 1499** Probably unchanged.

1867.20	313°0	6″95	3*n*	Δ
1879.33	312.1	6.68	1*n*	Cin

[Ma (*F. S.* **I**)...Δ (**II**)...Cin⁶...]

58 15 **5662.** **Σ 1505.** Fixed.

1867.82	313°3	8″04	3*n*	Δ
1904.35	311.5	8.25	1*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...Bl (**V**)...Cin⁵...]

5663. **H 174.** Nothing since Herschel but the following: $58^m\ 15^s$

1905.18	0°5	61″19	1*n*	β⁶	7.0...10.8

5664. **Ho 378.** Probably without change. 58 18

1895.40	227°2	0″39	2*n*	Ho
1899.39	230.3	0.51	2*n*	A
1901.29	225.3	0.48	3*n*	Bryant
1902.36	225.1	0.40	1*n*	Lewis
1904.19	233.6	0.46	7*n*	Doo

[Ho (3233, 3558)...A (3639)...Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403)..]

5665. χ *Leonis.* This star has an annual proper motion of 0″362 in the direction of 265°3 (Auwers). OΣ has measured a distant star. 58 30

1905.24	304°3	281″39	1*n*	β

In 1876 Mr. Alvan G. Clark mentioned to me that he had found with the Washington 26-inch that a distant companion to χ *Leonis* was a 1″5 pair. I could not see anything of it with the 6-inch, and later, in 1878, the 18½-inch failed to show any double companion. It would seem, therefore, there must be some mistake on the part of Mr. Clark as to the name of the star.

[OΣ (**X**, p. 85)...β⁶...]

5666. **A 676.** (AB = **Σ 1506.**) Since Part I was in type, the smaller component of Σ 1506 has been found by Aitken to be a close pair. 58 38

B and C

1904.18	56°8	0″22	2*n*	A	10.0...10.0

In 1879 the Cincinnati observers thought the principal star elongated in 270°, but it has not been seen double by later observers. There seems to be a little change in the small star.

A and BC

1868.76	214°5	10″59	4*n*	Δ
1903.64	216.2	11.35	3*n*	Hu
1904.08	216.1	11.12	1*n*	A

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...Cin⁶...A (*Pub. A. S. P.* **XVI**, 119) (*Bul. L. O.* No. 61)...]

5667. **Hu 638.** Discovered at the Lick Observatory. 58 53

[Hu (*Bul. L. O.* No. 57)...]

5671. **Σ 1507.** (= **H II. 78** = **S 619.**) Fixed. 59 54

1867.97	165°4	7″88	4*n*	Δ
1903.64	165.4	8.35	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1205)...Δ (**I, II**)...*A. G. Leipzig*, p. 248...]

5672. **Σ 1509.** (= **S 620.**) No motion. 0 31

1867.26	16°0	32″86	3*n*	Δ
1903.64	15.8	33.13	3*n*	Hu

[Ma (*F. S.* **II**)...En...Δ (**II**)...]

$0^m\ 43^s$ **5674.** **Σ 1508** *rej.* From H (V); "a third 10–11 m near." Not in DM, but about 5′ from the 8.2 m star, DM (69°) 600, and nearly *f.* The only measures are:

AB	1905.29	245°4	8″25	1*n*	β^6	9.3...9.4
AC	1904.35	345.0	36.99	1*n*	Hu	...9.5
BC	1904.35	357.5	39.40	1*n*	Hu	

0 47 **5675.** **H 1185.** "Points *n* between a faint neb. and star."

0 47 **5676.** 65 *Leonis.* **β 599.** Discovered with the 18½-inch. Auwers gives the proper motion of this star 0″434 in the direction of 262°1. It is obvious from the measures that this belongs also to the small star, and they must form a physical system. The relative motion appears to be direct.

1886.28	88°7	2″23	2*n*	HΣ
1887.32	87.0	1.66	3*n*	T
1889.27	88.5	1.78	3*n*	β
1893.34	86.7	1.87	2*n*	Sp
1894.24	85.3	1.94	3*n*	W
1899.13	93.2	1.95	1*n*	β
1899.34	91.4	1.22	1*n*	Lewis
1902.64	86.1	2.32	4*n*	Doo

[β (**X**)...β^1...β (2930)...β (*Pub. L. O.* **II**)...Cin^5...T (2899)...Sp (**III**)...Wilson (   )...HΣ (**XII**)...Lewis (*Mon. Not.* **LX**, 502)...Doolittle (*Pub. Flower Obsy.* **II**)...]

0 55 **5678.** **Σ 1511.** (= **H 175.**) Fixed.

1866.20	286°5	7″57	3*n*	Δ
1904.35	286.6	7.72	2*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...Se...Se^3...Δ (**II**)...Glasenapp (**II**)...*A. G. Leipzig*, p. 208...]

1 2 **5679.** *Ursae Majoris* 218. **Σ 1510.** Fixed. The principal star is given a proper motion of 0″044 in 262°2 (*A. G. Harvard*).

1868.77	338°9	4″03	4*n*	Δ
1899.22	334.4	4.46	1*n*	Bryant
1905.28	335.4	4.40	2*n*	β

[H^1...Ma (*F. S.* I)...Ma (**XI**)...H (**V**)...Δ (1205)...Δ (**I, II**)...Seagrave (*Sid. Mess.* **II**, 274)...Bryant (*Mon. Not.* **LX**, 502)...β^6...]

(See p. 1073)

1 52 **5681.** **Σ 1512.** Fixed.

1867.16	51°4	9″67	3*n*	Δ
1905.29	51.1	9.80	1*n*	β

[Ma (*F. S.* **I, II**)...Ma (**XIII, XV**)...Bl (**V**)...Δ (**II**)...Gl...β^6...]

2 1 **5683.** **H 839.** "A third 30″ *np* 350°."

1897.38	96°1	12″43	3*n*	Doo	8...10

[Doolittle (*Pub. Flower Obsy.* **I**)...]

2 17 **5684.** **H V. 68.** Described in H simply as "triple." Identified as given in Part I. B is DM (3°) 2462. The only observation since 1783 is:

AB	1904.61	228°1	150″12	2*n*	β^6	8.1...9.0
BC	1904.61	207.3	42.04	2*n*	β^6	...9.9

5685. **H 4410.** "Difficult." The only measure since 1836 is: $2^m\ 19^s$

1901.25	222°2	19″82	2*n*	β^5	7.5...13

The apparent change may not be real.

5686. **H IV. 106.** (= σ 376 = **Σ 1513** *rej.*) Magnitudes in H (VI), 8...11. The only measures are: 2 25

1879.33	131°1	20″62	1*n*	Cin	7.5...11.0
1905.11	133.0	20.05	2*n*	β	8.0...10.5

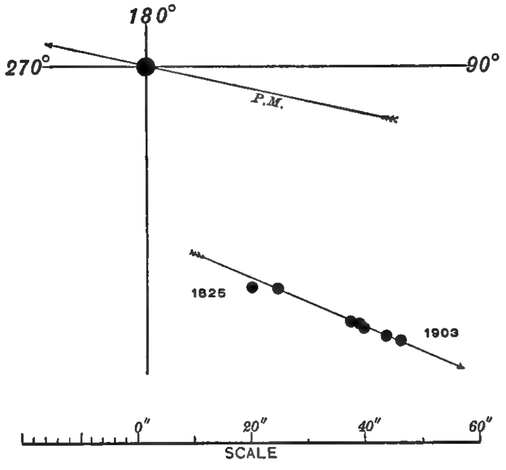
[H (**VI**)...Cin^5...β^6...]

5689. **H 177.** "Hardly divided with the sweeping power." Identified and measured: 3 21

1901.25	129°6	4″90	2*n*	β^5	9.6...10.1

5691. **S 621.** (= σ 377 = **OΣ (App) 107.**) B is Rad^1. 2629, $4^s.2$ *f* and 43″ *n*; mags., 8.0...8.1. The change in B is due to the proper motion of A, for which we have the following: 3 57

Porter	0″350 in 258°1
Schroeter	0.385 in 254.3
Measures of B	0.354 in 249.8



S 621

The last is the most probable motion, computed from the seven sets of measures given below.

1841.40	30°5	47″57	1*n*	OΣ	8.5...8.0
1875.49	38.5	57.66	5*n*	Δ	7.2...7.3
1880.04	39.3	58.81	3*n*	Doubiago	
1882.95	39.5	59.76	6*n*	Franz	7.1...7.1
1894.65	41.5	63.59	2*n*	Gla	
1895.40	41.6	63.60	1*n*	Gla	
1903.15	42.6	65.81	3*n*	β	

[Δ (**I**)...OΣ (**X**)...Franz (2649)...Flm...Glasenapp (**III, IV**)...β^6...]

4m 7s **5692.** Σ 1514. In the field with S 621. The later measures indicate that the angle in Struve is too small.

1867.91	343°3	1″21	3*n*	Δ
1890.53	341.9	1.19	3*n*	HΣ
1903.24	342.8	1.10	3*n*	Doo
1903.38	338.2	1.21	1*n*	Do

[Ma (*F. S.* I) . . . Δ (1800) . . . Δ (**II**) . . . Flm . . . HΣ (**XII**) . . . Do (3930) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

4 11 **5693.** **H** 4412. In O. Arg. S. 8–9 m. Probably fixed.

1879.25	266°5	11″92	1*n*	Cin	
1882.15	266.6	12.58	1*n*	W	7.5 . . . 8.6

[Cin^{5} . . . Wilson (Cin^{10}) . . .]

4 12 **5694.** **H** 2562. "A most beautiful and delicate double star." The measures indicate rapid motion in angle.

1830	347°2	1″5±	1*n*	H	
1881.36	327.6	1.24	1*n*	β^4	9.0 . . . 10.5
1903.23	313.0	1.24	2*n*	β^6	9.5 . . . 10.7

(See p. 1073)

4 30 **5695.** OΣ 231 *rej.* The principal star has a proper motion of 0″546 in the direction of 110°2 (Porter), and as there is no relative change in the position of B, this movement belongs also to that star. The distant star evidently does not belong to the system.

A and B

1867.23	264°9	36″03	3*n*	Δ
1881.85	264.3	36.03	2*n*	OΣ
1884.26	264.4	35.70	2*n*	HΣ
1894.37	264.6	35.59	2*n*	Eng
1898.56	264.1	35.70	3*n*	Hu

A and C

1884.26	341°1	153″40	3*n*	HΣ
1894.37	339.0	157.18	2*n*	Eng
1904.99	336.7	162.21	1*n*	β

[Ma (**XI, XIII**) . . . Δ (I) . . . OΣ (**X**, p. 86) . . . Engelhardt (**III**) . . . Hu (*Pub. L. O.* **V**) . . . β^6 . . .]

4 53 **5696.** Σ 3067. No change.

1868.32	234°9	20″86	4*n*	Δ
1905.05	235.2	20.90	1*n*	β

[Ma (*F. S.* **II**) . . . Δ (**II**) . . . β^6 . . .]

5 21 **5697.** Σ 3068. Probably without change.

1868.82	133°1	19″24	4*n*	Δ
1903.27	313.1	19.44	2*n*	β

[Ma (*F. S.* **II**) . . . Δ (**II**) . . . β^6 . . .]

6 2 **5699.** OΣ (App) 108. These stars are Lalande 21418 and 21421. The change is due to the proper motion of the first. The relative motion is shown by the following positions from meridian and micrometrical observations:

1800	77°0	110″80		Lalande
1825	73.9	118.96		Weisse
1876.56	71.7	128.37	3*n*	Δ
1880.3	71.5	129.20		*A. G. Lund*
1885.79	71.3	130.30	4*n*	Franz
1904.93	70.6	134.38	3*n*	β

[Δ (**II**) . . . Franz (3080) . . . β^6 . . .]

5700. **H** 494. (= Σ 1515 *rej.*) H (V) 157°4:30″: 9 . . . 9+. 6m 26s
The only later position is:

1904.89	331°0	29″21	2*n*	β^6	9.5 . . . 9.5

5702. β 220. *Crateris* 22. Discovered with the 6-inch. 6 33
This is ψ *Crateris* of Bode. In Argelander and Heis **6** m. Lalande 21445. Very little if any change. Some of the later measures are:

1877.93	143°5	0″55	10*n*	Sp
1884.10	149.1	0.45	5*n*	En
1887.27	140.3	0.58	3*n*	Sp
1889.10	136.1	0.71	4*n*	Lv
1890.24	137.0	0.65	3*n*	T
1898.16	138.8	0.44	1*n*	See
1901.15	143.8	0.68	4*n*	Doo

[β (**IV**) . . . β (*Mon. Not.* **XXXIV**, 382) . . . Δ (I) . . . Δ (2086) . . . Cin^{4} . . . Cin^{5} . . . Cin^{6} . . . Sp (2133) . . . Sp (**II** App.) . . . Pt . . . En (2678) . . . Lv^{1} . . . T (3186) . . . Jones (*A. J.* 312) . . . See ( ) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

5704. Ho 254. No change. 6 49

1899.29	160°2	2″67	1*n*	A
1905.08	162.4	2.52	5*n*	Doo

[Ho (2977, 3558) . . . A (3639) . . .]

5705. Ho 50. The later measures are: 7 2

1896.90	30°7	2″87	2*n*	Ho
1901.36	32.8	3.07	3*n*	Doo

[Ho (2778, 3558) . . .]

5706. Σ 1516. (= **S 622**; AC = **OΣ** 539.) The principal 7 16
star A has a large proper motion. This is given from meridian observations:

Porter	0″442 in 287°9
Kustner	0.425 in 285.4

The nearest approach to B occurred about 1855.5, when the distance by the Poulkowa measures was 2″32. This pair has been fully observed at Dorpat and Poulkowa from 1831 to 1874.

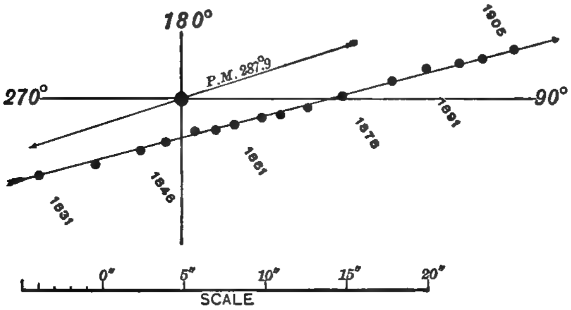
The following measures, given on the diagram, will be sufficient to show the relative change:

1831.55	298°7	9″93	2*n*	Σ
1840.45	308.3	6.67	3*n*	OΣ
1846.94	322.9	4.17	2*n*	OΣ
1850.92	341.7	2.97	2*n*	OΣ
1855.47	22.5	2.32	1*n*	OΣ

1858.87	48°.0	2″.96	3*n*	OΣ
1861.33	64.5	3.70	2*n*	OΣ
1865.43	76.9	5.18	2*n*	OΣ
1868.58	81.2	6.30	2*n*	OΣ
1872.54	86.1	7.90	3*n*	OΣ
1878.35	91.0	10.13	2*n*	Δ
1886.68	94.7	13.12	4*n*	Je
1891.27	96.8	15.37	2*n*	Hl
1895.38	97.2	17.47	2*n*	Collins
1899.49	97.6	18.90	2*n*	A
1905.17	99.1	22.00	2*n*	β

The faint star C was discovered by OΣ in 1858. This is moving with A, and they must therefore form a physical system.

1861.33	297°.0	8″.06	2*n*	OΣ
1866.49	297.2	7.73	3*n*	OΣ
1872.54	297.7	7.61	3*n*	OΣ
1879.41	298.2	7.66	2*n*	Hl
1891.27	298.9	7.58	2*n*	Hl
1899.49	300.6	7.34	2*n*	A
1905.05	302.3	7.33	1*n*	β



Σ 1516

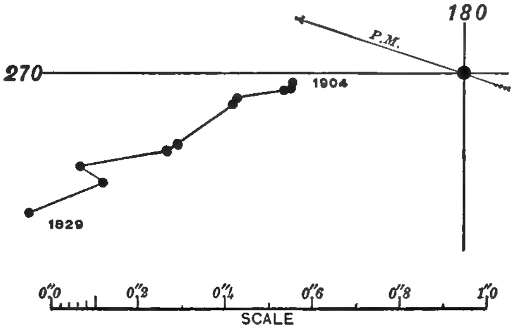
[Σ¹...H²...H (**V**)...Ma (*F. S.* **I**)...Ma (**IX, XI**)...Wr...Se...Se³...K (1519)...OΣ (**IX**)(**X**, p. 164)...OΣ (*Mon. Not.* **X**, 12)...Ra (**XXVII, XXVIII**)...Hd...Bru²...En (1674, 2663)...Fedorenko (*St. Pet. Bul.* 1850)...Flm...Flm (*Études et lectures sur l'ast.* Vol. **VI**)...Δ (1031, 1111, 1185, 1256, 1474)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...WS...WS²...Gl...Sk...Du...Seagrave (*Sid. Mess.* **II**, 22)...T (2898)...Big...Hl (**I, II**)...Je (2347, 2772)...Jones (*A. J.* 312)...L. de Ball (*Mem. Acad. Roy. de Belgique*, **XLIX**) parallax...Berberich (2624) parallax...Lewis (*Observatory*, **XVIII**, 111)...Engelhardt (**III**)...Big (*Bul. Ast.* **XII**, 299)...Bruno Peter (3206)...Collins (*A. J.* 378)...Bergstrand (3593)...A (3639)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Sk⁵...Do (3930)...β⁶...]

$7^m 24^s$ **5707.** **Σ 1517.** The components have the same proper motion, and form a binary system, but the motion is very slow. Σ thought the relative brightness variable, but this is not likely to be the case, as the stars are so nearly equal, the angle would be frequently reversed. For proper motion see *Pos. Med.* ccxiv, and OΣ (X, p. 86). Later determinations of this are:

Porter	0″.425 in 251°.8
A. G. Berlin	0.417 in 252.3

The change in the companion so far is practically rectilinear, but the measures are discordant, particularly in distance.

1829.70	287°.8	1″.05	5*n*	Σ
1845.32	286.8	0.87	2*n*	OΣ
1854.27	283.6	0.91	1*n*	Da
1870.08	284.6	0.71	5*n*	Δ
1875.39	284.0	0.68	3*n*	Sp
1888.26	278.0	0.54	4*n*	Sp
1888.32	276.5	0.53	4*n*	Hl
1895.00	276.1	0.42	7*n*	Com
1902.96	274.0	0.40	3*n*	Hu
1904.23	275.4	0.40	2*n*	Biesbroeck



Σ 1517

OΣ measures a distant star 10.5 m, which does not belong to the system.

1871.25	104°.3	198″.73	1*n*	OΣ
1881.27	103.7	200.95	1*n*	OΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...H¹...H²...H (**V**)...Bp...Da³...WJ²...Ba (**III**)...Se...Se³...OΣ (**IX, X**)...Du...Hl (**I, II**)...Do (2197) (*Trans. R. I. Acad.* **XXIX** Part 13)...Gl...WS...Sk²...Flm...β³...Δ (1185)...Δ (**I, II**)...Sp (2133)...Sp (**II**)...Sp (**II** App.)...En (2663, 2786)...Per...Per (2684)...T (2898)....Big....Glasenapp (**II**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797)...Com (*Pub. Washburn Obsy.* **X**)...Brown (3645)...Knorre (3518)...Ho (3558)...HΣ (**XII**)...]

5708. **Arg. 24.** "Duplex" in O. Arg. S. Measures from Wilson (Cin¹⁰). About 2^m *p* this is a 5″ pair of 10 m stars. $7^m 36^s$

5709. *δ Leonis.* **β 1282.** The duplicity of the distant companion to *δ Leonis* was noted with the 36-inch. The only measures are those given by Aitken. The large star has a proper motion of 0″.181 in 131°.5 (Auwers). 7 43

[β (*Pub. Y. O.* **I**)...A (3639)... OΣ (**X**, p. 87)...]

5710. *Crateris* **31.** **β 916.** Discovered with the 18½-inch. The change, if any, is slow. The magnitude in SD is 8.0. Lalande 21488. 8 4

1889.25	360°.2	0″.88	3*n*	β
1898.27	360.6	0.66	4*n*	A
1899.22	357.2	0.73	3*n*	Doo

[β (**XIII**)...β³...β (2930) (*Pub. L. O.* **II**)...Cin⁵...Pt...Wilson (Cin¹⁰)...Lv¹...Doolittle (*Pub. Flower Obsy.* **I, II**)...A (3584)...]

8^m 7^s **5711.** **β 1283.** Noted with the 36-inch in 1889, but not included in the Mt. Hamilton lists. This star is 10^{s}0 *f* and 4′ 58″ *n* of *θ Leonis*. Measures by Aitken. The only later observation shows change in the angle·

1904.61	203°7	0″35	2*n*	A

[β (*Pub. Y. O.* I)...]

8 18 **5713.** **Σ 1518** *rej.* This is a pair of small stars in the field with the 7.5 m star, DM (6°) 2421. The only measures are:

B and C (= Σ 1518 *rej.*)

1901.26	352°2	3″40	3*n*	$β^5$	9.7...9.9
1904.35	352.5	3.73	1*n*	Hu	

A and B

1901.23	256°4	103″50	2*n*	$β^5$	7.5...

8 28 **5714.** **OΣ 232.** Probably unchanged.

1845.61	234°0	0″52	3*n*	Ma
1870.15	233.5	0.65	5*n*	Δ
1874.49	235.4	0.58	6*n*	Du
1884.21	233.4	0.51	3*n*	Per
1898.28	239.9	0.64	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Per...Per (2685)...Du...Sk^3...Δ (**I**)...Knorre (3518)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

8 3 **5715.** **Σ 1519.** Probably fixed.

1867.91	285°9	1″22	3*n*	Δ
1879.33	287.2	1.13	1*n*	Cin
1899.22	290.6	1.26	1*n*	Bryant
1904.35	289.4	1.56	1*n*	Hu

[Δ (**II**)...Cin^5...Bryant (*Mon. Not.* **LX**, 502)...]

8 35 **5717.** **A 135.** No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

8 43 **5719.** **Hu 639.** Discovered at the Lick Observatory.

[Hu (*Bul. L. O.* No. 57)...]

8 55 **5720.** **Σ 1521.** (= **S 623.**) Fixed.

1870.62	95°5	3″54	6*n*	Δ
1890.12	94.6	3.70	5*n*	Giacomelli
1903.29	95.3	3.75	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H^2...Da^2...Da^3...Wr...Se...Se^3...H (**II, VII**)....Ra (**XXIV**)....Du....Δ (1205)....Δ (**I, II**)....Per....Per (2748).... Glasenapp (**II, III, V**)...Knorre (3518)...Giacomelli (**II**)...]

9 1 **5721.** **OΣ (App) 109.** Apparently unchanged.

1902.31	256°8	79″25	2*n*	Espin

[Δ (**I**)...Franz (3080)...Espin (*Mon. Not.* **LXII**, 532)...]

5722. **Σ 1520.** (= **H N. 68** = **Sh 119.**) These stars have shown no relative motion, but as they have the same proper motion they probably form a physical pair. This movement is given: 9^m 9^s

Porter	0″160 in 65°7
Gr. 10-year Catalogue	0.157 in 77.5

1866.59	345°1	12″86	4*n*	Δ
1905.05	344.7	12.80	1*n*	β

[Ma (*F. S.* **I**)...Ra (**XXIV**)...Δ (1205)...Δ (**I, II**)...Eng (**III**)...β^6...]

5724. **Sh 372.** (= **H N. 104.**) No measures in H. "Duplex Cl. III," in O. Arg. S. These stars are SD (15°) 3227 and 3226. The distance in Cin^4 is erroneous. 9 42

1879.25	299°6	18″51	3*n*	Cin	7.0...8.0
1903.31	300.3	19.27	2*n*	β	7.9...8.3

[Cin^4...Cin^5...β^6...]

5725. **Σ 1522.** Motion uncertain. 9 57

1868.69	178°9	2″86	4*n*	Δ
1898.17	176.0	2.55	3*n*	Doo
1904.35	181.3	2.57	1*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...Doolittle (*Pub. Flower Obsy.* **I**)...Greenwich Obsy. (*Mon. Not.* **LX** 502)...]

5729. *φ Leonis.* **Sh 121.** (= **H VI. 79** = σ 380.) The companion is SD (2°) 3314 (9.0). The principal star has a proper motion of 0″126 in 259°1 (Auwers), which explains the change in the distance of B. 10 34

1783.00	280° ±	98″58	1*n*	H	
1881.36	287.9	101.36	3*n*	β	...8.5
1888.30	288.1	100.43	2*n*	Eng	...8.9
1904.29	288.4	98.67	2*n*	β	...8.5

[Eng (**II**)...β^4...β^6...]

5732. **β 600.** *Crateris* 36. (AC = **H N. 26** = **Sh 120.**) The minute attendant to this wide pair was discovered with the 18½-inch. There appears to be a decided change in the angle. The distance of C in Sh is probably too large. These stars are respectively W^1 XI. 148 and 152. Heis gives this as a naked-eye star, 6–7 m; Cord. G. C. 6.0. Lalande 21540. 10 53

A and B

1878.15	226°4	1″25	1*n*	β
1892.17	216.0	1.23	2*n*	β
1898.27	240.6	0.98	3*n*	A

A and C

1878.89	97°4	61″25	3*n*	β	6.0...8.0
1892.16	97.6	60.46	3*n*	β	6.7...8.6
1898.27	97.7	60.59	3*n*	A	6.0...8.5
1898.29	97.4	60.53	1*n*	β	7.0...8.7

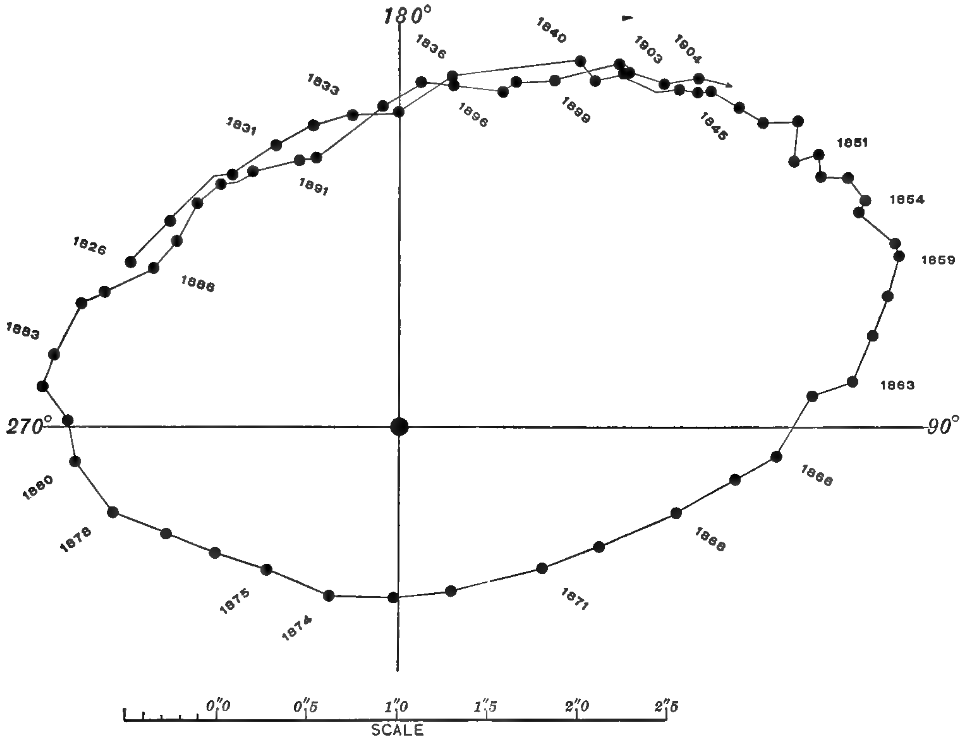
[β (**X**)...β^1..β^3...β (3142) (*Pub. L. O.* **II**)...A (3584)...]

$11^m 26^s$ **5733.** **OΣ 233.** No change. The principal star has a proper motion of 0″.095 in 253°.4 (Schroeter).

1868.59	337°.4	4″.93	3*n*	Δ	7.0...10.5
1898.34	334.3	4.90	3*n*	Hu	

[OΣ (**IX**) ... Δ (**I**) ... Seagrave (*Sid. Mess.* **II**, 22) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Boeger (*A. J.* 522) ... Do (3930) ...]

11 48 **5734.** ξ *Ursae Majoris.* **Σ 1523.** (= **H I. 2** = **Sh 122.**) More than one revolution has been completed since this pair was first accurately measured by Struve, and the orbit is well determined. The system has a proper motion of 0″.731 in 217°.5 (Auwers).



ξ Ursae Majoris. Σ 1523

On the accompanying diagram 64 yearly mean positions between 1826 and 1904 are shown. These represent measures on 238 nights by the following observers:

Σ	1826–1836	8
OΣ	1840–1874	30
Δ	1875–1878	4
Hl	1880–1891	12
Com	1892–1896	4
Hu, A, Doo	1897–1904	6

The following orbits have been computed, the date of the latest measure used being given in the first column:

1827	Herschel	60.72 yrs.	*Mem. R. A. S.* V, 207
1836	Savary	58.26	*A. N.* 319
1836	Madler	60.46	*A. N.* 319
1843	Madler	61.46	*A. N.* 486
1845	Jacob	61.17	*Mem. R. A. S.* XVI, 321
1847	Madler	61.30	*F. S.* I, 229
1848	Villarceau	61.58	*A. N.* 680
1855	Madler	61.18	*Dorp. Obsns.* XV, 52
1860	Breen	63.14	*Mon. Not.* XXII, 158
1867	Reuss	61.	*Bul. Sci. de France* 1867, II, 246
1872	Ball	59.88	*Mon. Not.* XXII, 336
1872	Hind	60.68	*Mon. Not.* XXIII, 101
1873	Flammarion	60.60	*Mon. Not.* XXXIV, 426
1876	Dunér	60.79	*Mesures Microm.* Lund, 1876
1877	Wolf	60.72	*A. N.* 2165
1878	Plummer	60.80	*Oxford Obsns.* No. 1
1879	Birkenmajer	60.50	*K. Akad. Wiss. Wien.* Bd. 93
1895	See	60.00	*Evolution of Stellar Systems*

The larger component is a spectroscopic binary, discovered by Wright (*Astrophysical Jour.* XII, 254).

[Ma (**IX, X, XI, XIII, XV**) ... Ma (319, 324, 430, 452, 486) ... Ma (*F. S.* **I**, 229) ... Σ1 ... BM (280) ... Ek (I) ... Savary (319) (*Connaisance des Tems*, 1830) ... Bes ... **H**1 .... **H**2 .... **H** (**II, V**) .... Wr .... Bp .... Da (*Mem. R. A. S.* **V**, 139) .... **Da**1 .... **Da**2 .... **Da**3 .... Fl .... Se .... Se2 .... Se3 .... Se (1614) .... Se (*Mon. Not.* **XXXIII**, 64) .... Fl .... K .... K (409, 1519) .... Peters (1042) .... Auwers (1393) .... Miller (806, 863) (*Mon. Not.* **XII**, 170; **XIII**, 259) .... J2 .... J3 .... WJ ... WJ2 ... **P**1 ... **P**2 ... Wh ... Wn (**V**) ... Wn (1738) ... *Durham Obsns.* 1846–48 .... OΣ (411) .... OΣ (**IX, X**) .... Bond (*Am. Acad.* **II**, 144) .... Villarceau (680) (*Mon. Not.* **IX**, 197) (*Comp. Rend.* **XXVIII**, 597) .... Ra (**XXIII, XXVIII, XLVII**) .... Hind (*Mon. Not.* **XXXIII**, 101) .... Breen (*Mon. Not.* **XXII**, 158) .... Erck (*Mon. Not.* **XXXIII**, 460; **XXXIV**, 124) .... En (1518, 1674, 2663, 2742, 2786) ... Wolf (2165) ... Flm ... Flm (1998) ... Flm (*Mon. Not.* **XXXIV**, 426) (*Comp. Rend.* **LXXVII**, 1234) (*Études et Lectures sur l'Ast.* Vol. **VI**) ... Lu (1103) ... Lu (**II, III**) ... Hd ... Ba (**I, II, III, IV**) ... Kn ... Kn (*Mon. Not.* **XXXII**, 222) ... Wilson (*Mon. Not.* **XXXII**, 270; **XXXIII**, 412) ... WS ... Gl ... Sk ... Sk2 ... Sk3 ... Pritchard (*Mon. Not.* **XLI**, 406) ... Δ (*Mem. Accad. Sci.*) .... Δ (1031, 1111, 1185, 1256, 1474, 1572, 1735, 1798, 1886, 1979, 2079, 2193)...*Δ* (**I, II**)...Du...Ferr...Sp (2133)...Sp (**I, II, II** App)...Waldo (2190)...Pk...Do (2197, 2199, 2433, 2989, 3378, 3799, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Bru^2...Bl (**V**)...Bl (*Trans. R. I. Acad.* 1873–74, p. 316)... Bl (*Mon. Not.* **XXXII**, 336)...Pl...Pt... Burton (*Mon. Not.* **XXXIV**, 125)... Hl (*Wash. Obsns.* 1880–86)....Hl (**I, II**)...Kustner (2584)...Franz (2590)... Per....Per (2684)....Perry (*Eng. Mech.* **XXXVIII**, 192) (*Ast. Reg.* **XIX**, 176) ....Je (2347, 2449, 2772)....T (2866, 3185)....Hayn (3051)....Reuss (*Bul. de l'Asso. Sci. de France* 1867, **II**, 246)... Knorre (*Beob. Berlin* No. 6, 1892)... β^4....Lv (*A. J.* 278)....Jones (*A. J.* 312)....*Proc. Haverford Coll. Obsy.* 1891, 1892....Big....Glasenapp (**II**)....Sp (**III**)....Maw (**I, II, III, IV**).... Glasenapp (**III, IV, V**)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Sk^4... Sk^5...Searle (*A. J.* 299)...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)...See (*A. J.* 349, 378)...Com (**X**)...Knorre (3300)...Ebell (3321)... Schwarzschild (3335)....See (3314, 3323)....Hu (*A. J.* 397, 427)....Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I, II**)...Brown (3645)...Ho (3558)... Giacomelli (**II**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 502, 518; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797)...Coleman (*Mem. R. A. S.* **LIII, LIV**)....A (*A. J.* 429) (3639)....Gl (*Mon. Not.* **LXI**, 556).... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Boeger (*A. J.* 522)...Gore (*Mon. Not.* **LXIII**, 166)...Biesbroeck...]

12^m 0^s **5735.** *ν Ursae Majoris.* **Σ 1524.** (= H N. 53.) Without change. The large star has a proper motion of 0″052 in 6°8 (Auwers).

1869.62	147°3	7″04	5*n*	*Δ*
1903.29	146.2	7.37	2*n*	Hu
1905.19	145.6	7.50	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...Wr...Se...Se^2...Se^3...H (**V, VII**)...OΣ (**IX**) ...Gl...WS...WS^2...Kn...Pk...β^1...β^3...*Δ* (**II**)...En (2663)...Ho (2978 3234)...Lewis and Bryant (*Mon. Not.* **LXI**, 486)...β^6...]

12 10 **5736.** **Wn 3.** Discovered by Winnecke. The reference to his original note of this pair has been lost, and I have been unable to find it. The only measures are my own. The first place was in error; but recently identified and measured:

1904.02	208°5	6″83	2*n*	β	8.7...9.6

[β^3...β^6...]

12 29 **5738.** **Σ 1526.** Without change.

1868.68	180°4	30″28	4*n*	*Δ*
1904.29	180.8	30.19	2*n*	β

[Ma (*F. S.* **II**)....*Δ* (**II**)...Cin^5 (called Σ 1525)...β^6...]

12 43 **5739.** **Σ 1527.** (= H N. 142 = S 625.) Perhaps a little change in the angle. The stars have a common proper motion of 0″139 in 170°4 (Porter).

1866.25	13°7	3″65	3*n*	*Δ*
1875.30	14.4	3.43	4*n*	Du
1880.69	15.0	3.77	3*n*	Sp
1884.21	14.6	3.61	5*n*	Per
1893.41	18.5	3.73	3*n*	Lewis
1897.29	16.6	3.52	3*n*	Doo
1903.25	18.0	3.31	4*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Bp...Da^3...Wr...Ba (**II, III, IV**)...Se...Se^3... *Δ* (1185)...*Δ* (**I, II**)...Du...WS^2...Flm...Pl...Je (2449)...Sp (**II**)...Ra (**XXIV, XXXVIII**)...Per...Per (2684)...Lv^1...T (2991)...Hayn (3051)... Big...Maw (**I, III**)...Jones (*A. J.* 312)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 502; **LXII**, 383; **LXIII**, 403; **LXIV**, 797)...Glasenapp (**II**) ....Doolittle (*Pub. Flower Obsy.* **I**)....Coleman (*Mem. R. A. S.* **LIII**).... Knorre (3632)....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)....Boeger (*A. J.* 522)...Thiele (3727)...Do (3930)...]

5740. **Σ 1525.** Fixed. 12^m 47^s

1867.15	178°8	2″14	3*n*	*Δ*
1903.02	176.5	2.27	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...]

5744. **Σ 1529.** (= S 624.) There has been no relative change. The components have a common proper motion, and hence probably form a physical system. 13 17

Porter	0″276 in 244°3
A. G. Nico.	0.263 in 238.8

1866.28	251°2	9″43	3*n*	*Δ*
1879.78	251.2	9.72	2*n*	Cin
1891.22	252.0	9.45	3*n*	Eng
1904.29	252.3	9.52	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H (**VII**)...Se...Se^3...Ra (**XXIII**)...*Δ* (1205) ...*Δ* (**I, II**)...Grant (*Mon. Not.* **XLIII**, 131)...Cin^5...Cin^6...Engelhardt (**III**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...β^6...]

5745. **A 136.** No other measures. 13 17

[A (3741) (*Bul. L. O.* No. 3)...]

5746. **Σ 1528** *rej.* The only measures are by Cogshall: 13 22

1903.29	217°0	19″13	3*n*	Cg	8.2...11.8

5747. **β 791.** Discovered with the 15½-inch at the Washburn Observatory. In DM 9.0 m. The following are the later measures: 13 26

1888.38	198°5	2″21	3*n*	Com
1898.27	197.3	2.15	3*n*	A
1901.32	200.3	2.22	3*n*	Doo

[β (**XII**)...β^2...Com (**VI**)...A (3584)...Doolittle (*Pub. Flower Obsy.* **II**)...]

5748. **Σ 1530.** Fixed. 13 40

1867.26	312°6	7″68	3*n*	*Δ*
1880.22	313.3	7.89	1*n*	β

[Bp....Ma (**XI**)....Ma (*F. S.* **I**)....H^1....H (**IV**)....Se.....Se^3....Ba (**II**).... Ra (**XXIII**)...WS...WS^2...Gl...*Δ* (1205)...*Δ* (**I, II**)...O. Stone (2201)... Cin^5...β^3...Wilson (Cin^{10})...LM...*Annals Toulouse Obsy.* **III**...]

5750. **Σ 1531.** Fixed. 14 23

1867.23	166°1	23″15	3*n*	*Δ*
1902.38	166.4	23.36	2*n*	Hu

[Ma (*F. S.* **II**)...*Δ* (**II**)...Cin^5...*Annals Toulouse Obsy.* **III**...]

5754. **H 2567.** "Fine." Probably DM (70°) 656. The only measure is the following: 15 13

1873.23	228°0	13″55	1*n*	*Δ* (I)	9.5...11.5

(See p. 1073)

5756. **O. Stone 22.** Discovered at the Cincinnati Observatory. Lalande 21644. 15 27

1885.18	306°6	5″70	1*n*	Wilson

[Cin^4...Wilson (Cin^{10})...]

$15^m\ 33^s$ **5757.** Σ 1534. Some change in angle, and perhaps in distance.

1864.76	330°6	4″72	4*n*	Δ
1870.30	330.9	5.13	1*n*	OΣ
1887.38	326.0	5.16	2*n*	Hl
1903.37	326.4	5.15	2*n*	Do

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... Se ... Se^3 ... Gl ... WS ... WS^2 ... Bru^2 ... Flm ... Pt ... Δ (1572) ... Δ (**II**) ... En (1674, 2663) ... Sk^2 ... OΣ (**IX**) ... Hl (**II**) ... Do (2303, 3730) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 502; **LXI**, 486; **LXIII**, 403; **LXIV**, 797) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ...]

15 36 **5758.** Σ 1533. No motion.

1866.49	172°2	23″01	3*n*	Δ
1881.39	172.8	23.16	2*n*	β

[Ma (*F. S.* **II**) ... H (**V**) ... Δ (**II**) ... β^4 ...]

15 40 **5759.** Σ 3069 *rej.* Measures by β^6.

15 52 **5760.** A. G. 174. Noted "duplex?" in *A. G. Chris.* No other measures.

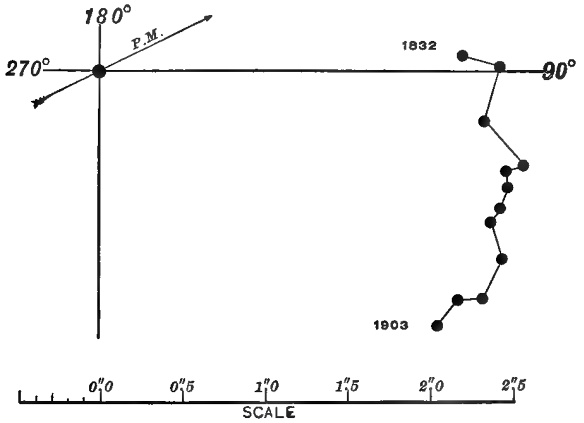
[β (*Pub. L. O.* **II**) ...]

16 45 **5762.** Σ 1535. Fixed.

1868.04	60°6	10″18	4*n*	Δ
1905.08	60.6	10.56	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

17 39 **5765.** *ι Leonis.* Σ 1536. Very slow angular motion, and probably binary, as the components have a common proper motion of 0″157 in 116°4 (Auwers). As the total motion is less than 40°, nothing can be inferred as to the form or extent of the apparent orbit. The following measures are sufficient to show the relative motion to this time:



ι **Leonis. Σ 1536**

1832.01	92°4	2″19	12*n*	Σ
1840.98	90.6	2.41	5*n*	OΣ
1850.11	82.6	2.34	4*n*	OΣ
1860.73	77.6	2.62	3*n*	OΣ
1863.99	76.2	2.53	11*n*	Δ
1867.14	74°2	2″56	7*n*	Δ
1871.82	71.1	2.56	7*n*	Δ
1876.96	69.0	2.54	6*n*	Δ
1886.37	65.1	2.69	3*n*	Hl
1893.32	59.4	2.70	2*n*	Gla
1897.69	57.5	2.57	4*n*	A
1903.37	53.1	2.56	2*n*	Biesbroeck

Two orbits have been found for this pair:

1889	Gore	116.27 yrs.	*Proc. R. I. Acad.* II
1895	Everett	178.6	*Mon. Not.* LV, 440

[Ma (*F. S.* **I**) ... Ma (324) ... Ma (**IX, X, XI, XIII, XV**) ... Σ^1 ... H (**VII**) ... K ... K (1519) ... BM (280) ... Da^2 ... Da^3 ... Da^4 ... Bp ... Wr ... Wn ... Wn (1738) ... P^1 ... P^2 ... J^2 ... J^3 ... WJ^2 ... Fl ... Se ... Se^2 ... Se^3 ... Se (1614) ... Bru ... Ba (**II, III, IV**) ... En (1674, 2663) ... Ra (**XXII, XXVII, XXVIII, XXXI, XXXV, XXXVIII**) ... OΣ (**IX, X**) ... WS ... WS^2 ... Gl ... Sk ... Sk^2 ... Sk^3 ... Waldo (2190) ... Ferr ... Bru^2 ... Pl ... Pk ... Do (2092, 2198, 2199, 3023, 3378, 3930) (*Trans. R. I. Acad.* **XXV**, 602; **XXIX**, Part 13) .... Do (*Mon. Not.* **XXXV**, 408) ... Flm ... Sp (2133) ... Sp (**II, II** App.) ... Δ (1111, 1185, 1256, 1474, 1735, 1886, 2079) ... Δ (**I, II**) ... Hl (*Wash. Obsns.* 1880, 1886) ... Hl (**I, II**) ... Pt ... Je (2347, 2449) ... Ho (2978) ... Hayn (3051) ... Kustner (2584) ... Per ... Per (2684) ... Lv^1 ... Gore (*Proc. R. I. Acad.* 3d Ser. Vol. **II**) orbit ... Big ... Jones (*A. J.* 312) ... T (2898) ... β (*Mon. Not.* **LI**, 391) ... Glasenapp (**II, III, IV, V**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 502; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) .... Everett (*Mon. Not.* **LV**, 440; **LVI**, 464) .... Knorre (3300) ... A (3465) ... Hu (*A. J.* 427) ... Ho (3558) ... Maw (**I, III, IV**) .... Coleman (*Mem. R. A. S.* **LIII**) .... HΣ (**XII**) .... Doolittle (*Pub. Flower Obsy.* **I**) ... Gl (*Mon. Not.* **LXI**, 556) ... *Annals Toulouse Obsy.* **III** ... Boeger (*A. J.* 522) ... Thiele (3837) ... Biesbroeck ... Salet (*Bul. Ast.* **XXII**, 108) ...]

5766. β 26. Discovered with the 6-inch. Probably without change. $17^m\ 42^s$

1879.31	66°4	2″66	2*n*	Cin
1888.67	68.7	2.86	2*n*	Lv
1890.23	71.0	2.92	2*n*	T
1899.11	70.8	2.60	2*n*	β
1901.34	69.3	2.78	4*n*	Doo

[β (**I**) ... β (*Mon. Not.* **XXXIII**, 351) (*Pub. Y. O.* **I**) ... Δ (**I**) ... Cin^5 ... Cin^6 ... Lv^1 ... T (3186) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

5767. Arg. 25. "Duplex Cl. II" in O. Arg. S. Examined and estimated as given. There is an error of 30° in the first measure by Wilson: 17 51

1882.71	301°8	22″09	2*n*	Wilson (Cin^{10})

5768. H. C. Wilson 9. From Cin^{10}. No other measures. 18 :

5770. Σ 1537. Fixed. 18 10

1866.98	354°6	2″35	3*n*	Δ
1902.38	355.1	2.38	2*n*	Hu

[Ma (*F. S.* **I**) ... H^1 ... H^2 ... Ma (**XI**) ... Se ... Se^3 ... Hd ... En (1674) ... Δ (**II**) ...]

5771. H 2570. "Triple." The only measures are: 18 15

AB	1903.95	283°9	20″78	1*n*	β^6	9.7 ... 10.0
AC	1903.95	217.8	40.39	1*n*	β^6	... 12.0

5772. Σ 3070. (= H 2571.) Probably fixed. 18 24

1866.99	276°7	8″25	3*n*	Δ
1881.38	276.4	8.39	3*n*	β
1904.30	277.0	8.21	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XIII**) ... Δ (**II**) ... β^4 ... β^6 ...]

18^{m} 54^{s} **5773.** γ *Crateris.* **H 840.** Apparently fixed, but common proper motion of 0″.118 in 274°.4 (Auwers).

1877.21	98°.3	5″.14	4*n*	Cin	4...9.5
1897.39	96.7	5.14	3*n*	Doo	

[Mu...Cin^5...Doolittle (*Pub. Flower Obsy.* **I, II**)...Do (3799)...]

19 21 **5775.** 81 *Leonis.* **H 4433.** (= **Ħ V. 61** = σ 385.) A is 6 m in Heis and Arg. It has a proper motion of 0″.172 in the direction of 269°.0 (Auwers), which corresponds to the apparent movement of the small star. Herschel's angle of 316°.7 is evidently wrong.

1840.26	339°.3	58″.50	3*n*	OΣ	6.4... 9.2
1870.30	344.1	57.76	1*n*	OΣ	
1875.33	344.6	57.40	1*n*	OΣ	
1881.36	345.5	57.25	2*n*	β	6.0...10.2
1897.35	347.1	56.83	3*n*	Doo	

[OΣ (X, p. 24)...β^4...Doolittle (*Pub. Flower Obsy.* **I**)...]

19 26 **5776.** **A 137.** No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

20 42 **5779.** 83 *Leonis.* **Σ 1540.** (= **Ħ IV. 13** = **Sh 124.**) There has been no relative change, but the components have the same proper motion of 0″.789 in the direction of 283°.2 (Auwers). The measure in Se^3 credited to this pair evidently belongs to some other star.

1865.93	150°.0	29″.49	3*n*	Δ
1892.37	150.2	29.23	4*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...BM (280)... Ra (**XXI, XXII**)... En... Ba (**II, III**)... H (**IV, V**)... Δ (1119)... Δ (**I, II**)... OΣ (**IX**)... Pk... Hl (**I**, p. 131)... Gl... Je (2347)... Per... Per (2684)... Eng (**II**)... β (3142) (*Pub. L. O.* **II**)....Glasenapp (**II, III**)....Coleman (*Mem. R. A. S.* **LIII**)....*Annals Toulouse Obsy.* **III**...]

21 4 **5781.** **Σ 1541.** Fixed.

1868.20	28°.7	7″.54	4*n*	Δ
1905.05	28.7	7.76	1*n*	β

[H (**V**)...Ma (**XI**)...Δ (**II**)...β^6...]

21 12 **5782.** **A 138.** No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

21 24 **5784.** **Innes 76.** Discovered at the Cape of Good Hope.

[Innes (3406) (*Mon. Not.* **LVII**, 533; **LXIII**, 76)...]

21 25 **5785.** **Σ 1542.** The following are all the measures since Struve:

1844.31	265°.6	2″.90	1*n*	Ma
1867.43	266.1	2.91	3*n*	Δ
1899.40	259.4	3.21	1*n*	Lewis
1899.43	264.3	3.18	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Lewis and Bowyer (*Mon. Not.* **LX**, 502)...]

5786. **H 498.** The only observation since H is: 21^{m} 31^{s}

1880.29	79°.4	....	2*n*	Big	10...11.5

5787. **Σ 1539.** (= **Sh 123.**) Probably fixed. 21 35

1867.18	312°.7	19″.09	3*n*	Δ
1879.33	312.0	19.31	1*n*	Cin

[Ma (*F. S.* **I**)....Δ (**II**)....Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Cin^5....] (See p. 1073)

5789. **H 499.** In another observation H gives magnitudes, 9...10. In DM 8.5 m. 21 44

5790. τ *Leonis.* **Σ 19 App. I.** (= **Ħ VI. 12** = **Sh 125** = **OΣ (App) 110.**) Rectilinear motion. The large star is given a proper motion of 0″.016 in 248°.1 (Auwers). If this is correct, B has some proper motion of its own. 21 46

1863.26	171°.7	93″.39	3*n*	En
1868.91	171.9	93.74	5*n*	Δ
1877.77	172.5	93.53	9*n*	Je
1883.52	173.2	92.69	5*n*	En
1893.35	173.4	92.47	2*n*	Gla
1904.30	174.2	92.28	2*n*	β

[Se^1 (error in P)... Ra (**XXVII, XXXV, XXXVIII**)...Flm... Pk... Schur (2255) ...En...En (2663)...Δ (**II**)...Je (2338)...Glasenapp (**II, III**)...β^6...]

5791. **Σ 3071** *rej.* From *Catalogus Novus.* The only modern observation is this: 21 52

1904.30	302°.8	29″.47	2*n*	β^6	9.0...10.3

5793. 57 *Ursae Majoris.* **Σ 1543.** (= **Ħ III. 86** = **S 626.**) Probably unchanged. Later observers make the angle less, but do not indicate any certain relative motion. There is some proper motion common to both components, 0″.079 in 286°.9 (Auwers). 22 37

1855.35	4°.8	5″.58	5*n*	OΣ
1866.13	6.7	5.41	3*n*	Δ
1875.33	5.6	5.62	4*n*	Sp
1877.41	2.4	5.47	2*n*	Hl
1886.39	4.1	5.52	3*n*	Hl
1890.17	4.7	5.49	4*n*	Giacomelli
1903.39	2.2	5.40	3*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Da^3...J^2...WJ^2...OΣ (**IX**)...Ra (**XXIV**)? ...Du...Bl (**V**)...Gl...WS^2...Sk^2...Bru^2...Δ (1185)...Δ (**I, II**)...Sp (2133)...Sp (**II**)...Pl...Flm...Hl (*Wash. Obsns.* 1886)...Hl (**I, II**)...β^1... Seagrave (*Sid. Mess.* **II**, 22)...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ....Per....Per (2684, 2748)....Big....Maw (**II**)....Glasenapp (**III**)....Collins (*A. J.* 378)...Knorre (3518)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**) ...HΣ (**XII**)...Espin (*Mon. Not.* **LXII**, 529)...Boeger (*A. J.* 522)...Thiele (3837)...Sk^5...Do (3930)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

5794. **Lewis 11.** Discovered by Lewis at the Greenwich Observatory. 22 56

1902.67	10°.6	0″.99	3*n*	Lewis

[Lewis (*Mon. Not.* **LX**, 502; **LXI**, 486; **LXII**, 389; **LXIII**, 403; **LXIV**, 797)...]

$23^{m}15^{s}$ **5796.** **β 601.** (AB = **H IV. 112 = S 627.**) The close pair was discovered with the 18½-inch. There is no material change, and the wide pair is apparently fixed.

B and C

1879.34	232°3	0″73	1*n*	β	8.0...9.0
1879.18	224.6	0.87	2*n*	Cin	7.2...8.7
1888.65	223.2	0.75	2*n*	Lv	7.7...8.7
1898.26	220.0	1.01	3*n*	A	8.5...9.3
1904.14	222.0	0.93	3*n*	Doo	

A and BC (= S 627)

1825.25	330°7	29″96	3*n*	S	
1878.34	331.6	28.16	2*n*	β	
1898.26	330.4	28.31	3*n*	A	7.5...8.5

[β (**X**)...β¹...β³...Cin⁵...Cin⁶...Wilson (Cin¹⁰)...Lv¹...**LM**...A (3584)... Doolittle (*Pub. Flower Obsy.* **II**)...]

23 15 **5797.** **A 6.** No other measures.

[A (3635) (*Pub. A. S. P.* **XI**, 181)...]

23 19 **5798.** **H 4572.** The only later observation is the following:

1880.29	182°5	36″42	1*n*	Big	9.5...11

(See p. 1073)

23 35 **5799.** **A 7.** No other measures.

[A (3635) (*Pub. A. S. P.* **XI**, 181)...]

23 41 **5800.** *Hydrae* 271. **Jacob 6.** (= **Hd 129.**) From J². In WJ magnitudes, 7...9.5, with a distant 9 m star, 114°8 : 120″±. The principal star is Lacaille 4757. Apparently fixed.

1879.22	78°8	8″16	2*n*	Cin	6.0...8.7
1903.35	78.1	8.51	2*n*	Scott	

[WJ...J²...Hd...Cin³...Cin⁴...Cin⁵...Cin⁶...Wilson (Cin¹⁰)...Do (3799)... Scott (*Mon. Not.* **LXIV**, 52)...]

23 44 **5801.** **OΣ (App) 111.** (= σ 384.) B is W² XI, 420. There is an error of 5 m R. A. in the original place of σ 384. The principal star is given a proper motion of 0″229 in 200°5 (Porter), and B must have the same movement, as there is no relative change.

1887.10	33°0	66″93	4*n*	Franz
1905.05	33.4	66.91	1*n*	β

[Δ (I)...Franz (3080)...β⁶...]

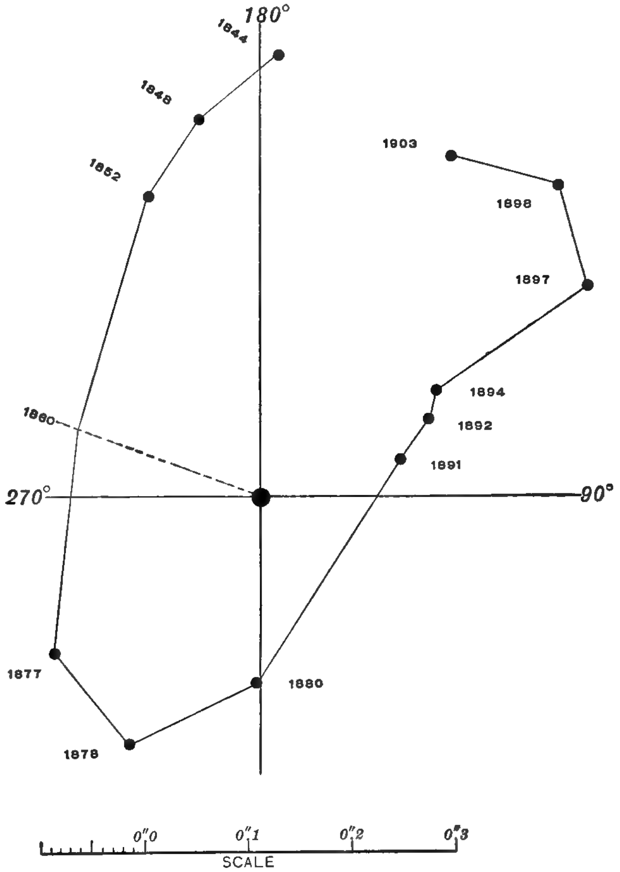
23 49 **5803.** **β 340.** Discovered with the 6-inch. Change, if any, is small.

1883.84	8°3	4″25	9*n*	En
1893.33	9.0	4.28	2*n*	Gla
1898.20	6.8	4.23	3*n*	Doo
1899.04	7.5	4.26	2*n*	β
1901.33	7.9	4.34	3*n*	Doo

[β (**VI**)...β (2062) (*Pub. Y. O.* I)...Δ (I)...Pt...En (2678)...Glasenapp (**II**)... Doolittle (*Pub. Flower Obsy.* I, II)...]

5804. **Sh 126.** There is no such pair in or near this place. In Sh it is called H N. 70, and it is undoubtedly that pair (= Σ 1544), but that is more than 18° *n* of this place. (See No. 5806.) $24^{m}17{:}^{s}$

5805. **OΣ 234.** A binary in moderately rapid motion. Since discovery nearly one revolution has been completed. As it is always a difficult pair, the measures are more or less uncertain, and many of them incomplete. Hussey has collected all the measures to 1900, and given them in *Pub. L. O.* V. The system has a proper motion of 0″130 in 135°8 (*Greenwich 10-year Catalogue*). Two provisional orbits **have** been found: 24 20



OΣ 234

1885	Gore	63.45 yrs.	*A. N.* 2743
1895	See	77.0	*Evolution of Stellar Systems*

The following observations are shown on the diagram:

1844.66	177°5	0″43	3*n*	OΣ
1848.66	188.9	0.37	3*n*	OΣ
1852.09	200.3	0.31	3*n*	OΣ
1860.12	250	obl.	5*n*	OΣ
1877.26	307.3	0.25±	2*n*	Δ
1878.32	331.7	0.27	1*n*	β
1880.37	358.4	0.18	1*n*	β
1891.23	104.2	0.14	3*n*	β

1892.28	114°.2	0″.18	4*n*	β
1894.83	121.7	0.21	3*n*	Barnard
1897.62	122.4	0.38	3*n*	Hu
1898.94	135.9	0.42	3*n*	A
1903.79	150.4	0.38	5*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX, X**)...Δ (**I**)... En (2678, 2786)... Sp (**I**)... Sk^2... Flm ...Big... Lv (*A. J.* 278) ... *Proc. Haverford Coll. Obsy.* 1892...Gore (2743) (*Proc. R. I. Acad.* **IV**, 1886) orbit...β^1...β^3...β (3114, 3142)(*Pub. L. O.* **II**) ...Big (*Bul. Ast.* **XII**, 299)...Barnard (*A. J.* 447)...Everett (*Mon. Not.* **LVI**, 464)...See (*A. J.* 359, 378)... Com (**X**)... Doolittle (*A. J.* 416)(*Pub. Flower Obsy.* **I**)....Hu (*A. J.* 427)(*Pub. L. O.* **V**)....Brown (3645)....HΣ (**XII**).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797)...A (3585)...Biesbroeck...]

(See p. 1073)

$24^m\ 32^s$ **5806.** **Σ 1544.** (= **H N. 70** = **S 628** = **Sh 126.**) Fixed. (See No. 5804.)

1866.77	90°.7	12″.34	3*n*	Δ

[Ma (*F. S.* **I**)....Ma (**XI**)....Ra (**XXIV**).... Δ (1185).... Δ (**I, II**).... *Annals Toulouse Obsy.* **III**...]

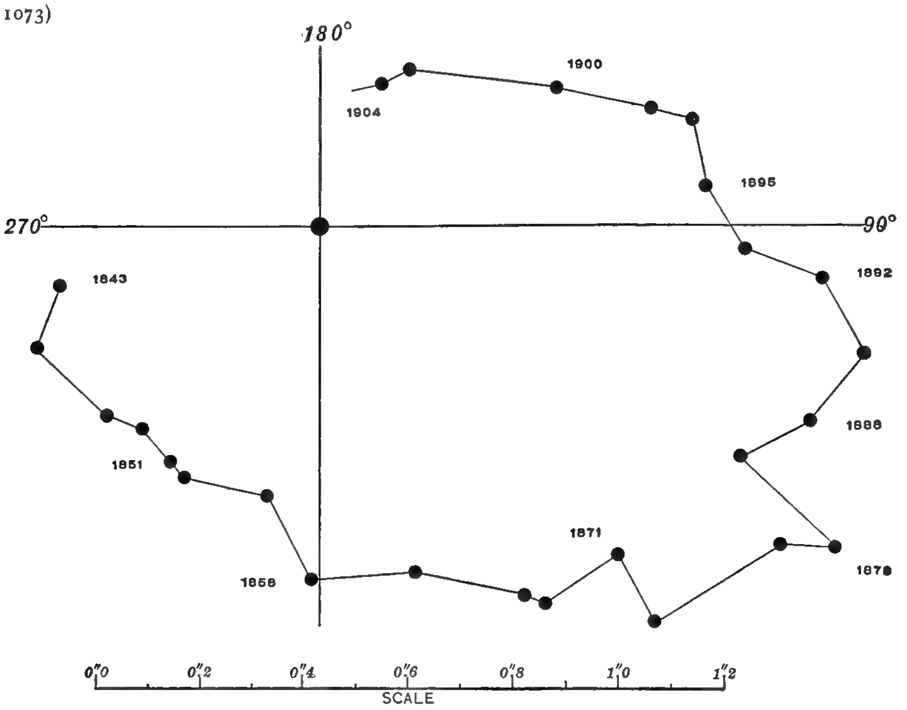
(See p. 1073)

5811. **OΣ 235.** The companion has described nearly one revolution since this pair was discovered by **OΣ**. Three orbits have been computed: $25^m\ 32^s$

1877	Doberck	94.41 yrs.	*A. N.* 2294
1895	See	80.0	*Evolution of Stellar Systems*
1900	Hussey	66.0	*Pub. L. O.* V

The latter period is likely to be very nearly correct. The apparent orbit will be seen from the following positions:

1843.61	282°.7	0″.52	2*n*	Ma
1844.90	293.0	0.60	2*n*	OΣ
1846.94	311.3	0.55	2*n*	OΣ
1849.89	318.6	0.52	2*n*	OΣ
1851.42	327.9	0.54	2*n*	OΣ
1852.94	331.5	0.55	2*n*	OΣ
1856.51	348.8	0.53	3*n*	OΣ
1858.92	358.7	0.68	2*n*	OΣ
1861.74	15.6	0.69	3*n*	OΣ
1865.46	29.3	0.81	2*n*	OΣ
1868.13	31.0	0.84	1*n*	Δ
1871.29	42.3	0.85	2*n*	Δ
1871.53	40.2	0.99	2*n*	OΣ
1877.26	55.5	1.07	2*n*	Δ
1878.36	58.0	1.16	4*n*	Δ
1881.38	61.2	0.92	2*n*	β
1888.91	68.3	1.01	2*n*	OΣ
1889.35	76.9	1.07	5*n*	Hl
1892.12	84.3	0.97	3*n*	β
1893.39	87.1	0.82	6*n*	Com
1895.78	96.1	0.75	7*n*	Com
1897.90	106.1	0.75	2*n*	Hu
1898.91	109.6	0.68	3*n*	A
1899.15	112.4	0.59	2*n*	Bryant
1900.93	120.8	0.53	2*n*	Hu
1903.39	150.9	0.35	3*n*	Biesbroeck
1904.23	157.2	0.30	2*n*	Biesbroeck
1905.33	177.3	0.32	2*n*	A



OΣ 235

24 44 **5807.** **Σ 3072.** (= **H 1190.**) Without change.

1867.55	330°.1	9″.43	4*n*	Δ
1880.22	330.4	9.53	1*n*	β
1905.05	330.6	9.45	1*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...*Wash. Obsns.* 1863... Δ (**II**)... β^1...β^3...Pt...Cin^5 ...Wilson (Cin^{10})...Big...β^6...]

25 25 **5809.** **H 500.** The only later measures are:

1880.25 27°.0 25″.30 4*n* Big 9.5...9.5

25 29 **5810.** **Ho 51.** Later measures show no motion.

1895.33	173°.8	2″.40	2*n*	Ho
1905.06	174.3	2.57	3*n*	Doo

[Ho (2778, 3558)...]

The last measure by Aitken, with the 36-inch, was received after the diagram was made.

[Ma (**XI**)...OΣ (**IX, X**)... Δ (2193)... Δ (**I**)...WS^2... Flm... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (2294, 2433, 3023, 3378, 3930)... T (2991)... Hl (**I, II**)...En (2678)...Seagrave (*Sid. Mess.* **II**, 22)...Big...Lv (*A. J.* 278)... Jones (*A. J.* 312).... *Proc. Haverford Coll. Obsy.* 1892....Maw (**I**).... β^4.... β (3142)(*Pub. L. O.* **II**)...Big (*Bul. Ast.* **XII**, 299)...Everett (*Mon. Not.* **LVI**, 464)...See (*A. J.* 359, 378)...Com (**X**)...Brown (3645)...A (3585)...Bryant (*Mon. Not.* **LXI**, 486; **LXII**, 383)...Hu (*A. J.* 427)(*Pub. L. O.* **V**)...Doolittle (*A. J.* 416)(*Pub. Flower Obsy.* **I**)...HΣ (**II**)...Biesbroeck...]

(See p. 1073)

25^m 34^s **5812.** 88 *Leonis.* **Σ 1547.** (= **Ḥ III. 51 = Sh 127.**) Only a little change in the angle, but the stars have a large common proper motion:

Auwers	0″412 in 243°8
Porter	0.401 in 242.7

1782.30	317°5	14″63	1*n*	Ḥ
1852.16	322.0	15.28	1*n*	OΣ
1865.46	322.2	15.25	3*n*	Δ
1878.32	323.8	15.35	4*n*	Je
1885.30	323.4	15.57	6*n*	Per
1904.33	325.0	15.41	2*n*	β

[Ma (*F. S.* **II**)... Ma (**XIII, XV**)... H (**VII**)... Ra (**XXI**)... OΣ... Δ (**II**)... Sp (**II**)... Per... Per (2684, 2748)... Je (2347)... Eng (**II**)... Glasenapp (**IV**)... Coleman (*Mem. R. A. S.* **LIV**)...β^6...]

25 45 **5813.** **Σ 1546.** Relatively fixed.

1869.00	345°1	11″37	4*n*	Δ
1904.99	343.9	11.32	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...β^6...]

25 55 **5814.** **H 2574.** "Close to a bright nebula." The nebula referred to is *Dreyer* 3718. The only measure is:

1904.99	78°1	37″46	1*n*	β^6	9.5...9.5

25 59 **5815.** **Σ 1548.** (= **H 181.**) Fixed.

1867.26	127°3	10″50	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...Wilson (Cin^{10})...*Annals Toulouse Obsy.* **III**...]

(See p. 1073)

26 4 **5816.** **H 3332.** "Large star *p*" referred to by H is DM (67°) 703 (8.3).

26 5 **5817.** **Kr 38.** Noted as double in *A. G. Hels.*

1898.37	52°9	2″71	3*n*	Doo
1905.20	52.2	2.67	2*n*	Hu

[β (3042) (*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

26 18 **5819.** **Σ 1549.** (= **H 501.**) Probably fixed.

1867.29	115°5	13″33	3*n*	Δ
1887.37	114.7	13.65	2*n*	Hl
1903.27	114.9	13.53	2*n*	Doo

The principal star has a small proper motion:

Porter	0″073 in 180°0
A. G. Berlin	0.081 in 189.6

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Δ (1735)... Hl (**II**)... Pt... Cin^6... Big... Do (3930)...]

5820. 17 *Crateris.* **Ḥ III. 96.** Probably without change. The proper motion is common to both stars. This is given as 0″144 in 0°0 (Porter). 26^m 19^s

1857.29	211°6	8″82	2*n*	Wr	
1877.11	211.3	8.72	1*n*	Cin	6.0...6.0
1893.33	210.4	8.58	2*n*	Gla	5.2...5.3
1903.23	210.0	9.00	5*n*	Jouffray	

[H^3...Dun...Wr...P^1 ..WJ... J^2...J (*Mon. Not.* **XIV**, 242)... Cin^3...Cin^4... Cin^5....Eng (**II**)....Glasenapp (**II**)....Scott (*Brit. Ast. Ass'n* **V**, 75) (*Mon. Not.* **LXIV**, 52)...See (3496)...Tebbutt (*Mon. Not.* **LXII**, 487)...Do (3799)... Jouffray (*Bul. Ast.* **XXI**, 299)...]

5821. **Kr 39.** Noted as double in *A. G. Hels.* 26 36

AB	1898.35	154°0	10″97	3*n*	Doo	8.9... 9.2
AC	1898.35	270.4	17.64	3*n*	Doo	...10.5

[β (3042) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5822. **Hu 727.** The mean of three measures is: 26 40

1904.20	16°4	1″06	3*n*	Hu	8.8...9.1

[Hu (*Bul. L. O.* No. 65)...]

5823. **Hd 130.** A recent examination of this pair, since Part I was in type, shows that the measure given there from Hd belongs to Hd 129 (No. 5800). Hd 130 is quite a different pair. The following is the only measure: 26 58

1903.72	345°1	10″02	2*n*	β^6	7.5...13.0

5826. **A 139.** No other measures: 27 20

[A (3741) (*Bul. L. O.* No. 3)...]

5829. **H 2577.** "Delicate." In most instances Herschel's estimated distances are much too small. In this case the present distance is much less. 28 10

1904.09	186°0	4″51	2*n*	β^6	9.0...12.5

5830. **Σ 1551.** Without change. 28 14

1867.84	109°4	6″54	3*n*	Δ
1879.32	109.4	6.48	1*n*	Cin

[Ma (*F. S.* **II**)...H (**V**)...Δ (**II**)...Cin^5...]

$28^m\ 28^s$ **5833.** 90 *Leonis*. **Σ 1552.** (= **H I. 27 = Sh 128.**) The distant star was not measured by Σ. The distance may have increased.

1822.27	233°.3	60″.75	2*n*	Sh
1893.17	234.6	63.40	1*n*	Jones
1893.33	234.9	62.99	2*n*	Gla
1898.26	233.9	63.16	3*n*	Doo

Probably no change in the Struve companion. The principal star has a proper motion of 0″.033 in 282°.0 (Auwers).

1866.23	212°.1	3″.17	3*n*	Δ
1875.73	209.9	3.24	5*n*	Sp
1890.18	208.9	3.16	3*n*	Giacomelli
1898.26	213.3	3.24	3*n*	Doo
1903.14	210.6	3.04	1*n*	Do

[Ma (*F. S.* **II**) ... Ma (**X, XI, XIII, XV**) ... H (**VII, VIII**) ... Da³ ... Se ... Se² ... Se³ ... Wr ... Ba (**II, III**) ... OΣ (**IX**) ... Δ (1119) ... Δ (**I, II**) ... WS ... WS² ... Gl ... Sk² ... Do (2199, 3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Lassell (*Mon. Not.* **XIII**, 183) ... Per ... Per (2684) ... Big ... Je (2772) ... Lassell (858) ... T (2898) ... Sp (**II**) ... Giacomelli (**II**) ... Jones (*A. J.* 312) ... Glasenapp (**II, III**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Coleman (*Mem. R. A. S.* **LIII**) ... *Annals Toulouse Obsy.* **III** ... Thiele (3837) ...]

28 36 **5835.** **A. G. 175.** Double in *A. G. Albany.*

1902.37	5°.8	1″.77	3*n*	Cg	8.7 ... 10.0

[β⁶ ... Cogshall (*A. J.* 554) ...]

29 22 **5837.** **OΣ 236.** Probably no motion.

1870.72	205°.5	2″.52	4*n*	Δ
1898.40	201.7	2.36	3*n*	Hu
1901.10	204.4	2.40	3*n*	Doo
1903.42	200.2	2.15	2*n*	Do

[OΣ (**IX**) ... Δ (**I**) ... Hu (*Pub. L. O.* **V**) ... Do (3930) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

29 55 **5840.** **Σ 1554.** Probably unchanged.

1866.30	252°.4	0″.86	3*n*	Δ	8.9 ... 9.1
1896.50	252.0	0.95	3*n*	A	
1903.29	257.0	0.91	3*n*	Bowyer	

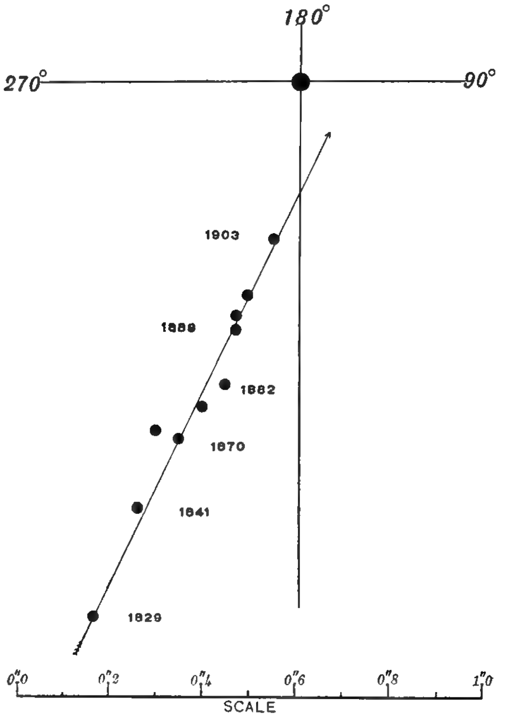
[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se³ ... Δ (**II**) ... A (3395) ... Glasenapp (**V**) ... Greenwich Obsy. (*Mon. Not.* **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIV**, 797) ...]

29 59 **5841.** **Σ 1555.** (AC = **H 503 = H 504.**) Close pair may be binary, but the motion to this time is practically rectilinear and uniform. It will soon be a difficult pair, with a minimum distance of about 0″.1. The meridian observations give a proper motion of 0″.07 in 180° (Porter).

1829.12	339°.3	1″.24	5*n*	Σ
1841.87	339.7	0.99	2*n*	OΣ
1847.86	337.9	0.82	2*n*	OΣ
1870.08	341.6	0.82	5*n*	Δ
1875.74	343.6	0.74	2*n*	Sp
1882.24	346.5	0.68	3*n*	β
1888.32	346.1	0.56	3*n*	Hl
1891.32	345.2	0.53	2*n*	Ho
1897.92	346.8	0.48	4*n*	Hu
1903.33	350.9	0.35	3*n*	A

The faint star appears to be fixed.

1871.31	145°.1	21″.11	2*n*	Δ	... 11.0
1882.22	144.9	21.00	2*n*	En	... 10.7
1882.24	145.1	21.17	3*n*	β	... 10.9
1888.32	146.5	21.16	2*n*	Hl	
1903.36	147.6	21.04	1*n*	Do	



Σ 1555

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... H¹ ... H² ... H (**V, VI**) ... Da¹ ... **Wr** ... Se ... Se³ ... OΣ (**IX**) ... En (1674, 2663, 2786) ... Du ... Δ (1119, 1256) ... Δ (**I, II**) ... Do (2198, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (2133) .... Sp (**II**) .... WS² .... Sk² .... Per .... Per (2684) .... Je (2772) .... Flm .... Hl (**I, II**) .... β³ .... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 355; **LIX**, 400; **LX**, 502; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) ... Glasenapp (**II**) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... A (3395) ... Porter (3452) ... Hu (*A. J.* 427) ... Knorre (3518) ... Coleman (*Mem. R. A. S.* **LIII**) ... HΣ (**XII**) ... Brown (3645) ... Biesbroeck ...]

5842. **Σ 1553.** Fixed. $30^m\ 3^s$

1868.77	170°.3	5″.37	4*n*	Δ
1898.45	169.5	5.70	3*n*	Coleman

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Da³ ... H (**IV, V**) ... Wr ... Ra (**XXIV**) ... OΣ (**IX**) ... Δ (1205) ... Δ (**I, II**) ... Pl ... Du ... Seagrave (*Sid. Mess.* **II**, 22, 274) ... Collins (*A. J.* 378) ... Knorre (3518) ... *Annals Toulouse Obsy.* **III** ... Espin (*Mon. Not.* **LXII**, 529) .... Boeger (*A. J.* 522) .... Thiele (3837) .... Do (3930) .... Coleman (*Mem. R. A. S.* **LIV**) ...]

5843. **Σ 1556.** Without change. Error in angle of Ma (XV). 30 4

1869.26	231°.0	8″.78	4*n*	Δ
1904.32	232.4	9.01	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... H (**V**) ... Δ (**II**) ... β⁶ ...]

30^m 26^s **5846.** **Σ 1558.** (AC = **S 629.**) Probably unchanged.

A and B

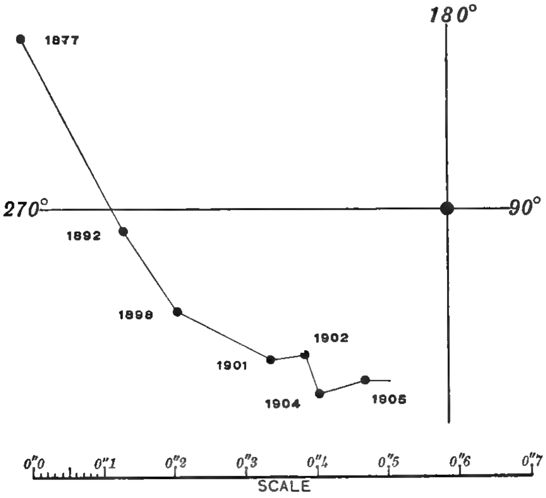
1868.63	154°.3	1″.30	3*n*	Δ
1898.32	161.2	1.65	2*n*	Gla
1902.38	156.6	1.38	2*n*	Hu

AB and C

1868.63	276°.3	43″.25	3*n*	Δ
1898.32	275.7	43.88	2*n*	Gla
1902.38	275.9	43.14	2*n*	Hu

[**Ma** (*F. S.* **I**)....**Ma** (**XI**)....**H** (**V**)...**WS**^{2}...**Δ** (**II**)...**Glasenapp** (**V**)...**Bryant and Bowyer** (*Mon. Not.* **LX,** 502)...]

30 44 **5848.** **β 456.** Discovered with the 6-inch. It is a binary system beyond question. In SD 9.0 m. Rapid motion in angle.



β 456

The following are all the measures:

1877.35	248°.2	0″.65	2*n*	Hl	10 ...10
1878.22	257.0	....	2*n*	Cin	8.7... 9.0
1880.24	255.2	....	1*n*	Cin	9.5... 9.5
1892.37	274.2	0.46	3*n*	β	8.7... 9.0
1894.28	278.7	0.31	1*n*	Com	
1895.32	269.7	0.25±	1*n*	Com	
1898.21	290.8	0.41	3*n*	A	8.5... 9.0
1901.31	310.4	0.33	3*n*	A	8.8... 9.2
1902.40	315.7	0.29	3*n*	A	
1904.18	325.1	0.32	3*n*	A	
1905.14	333.8	0.27	1*n*	A	

[**β** (**IX**)...**β** (*Mon. Not.* **XXXVIII,** 78)...**β** (3142) (*Pub. L. O.* **II**)...**Hl** (**I**)...**Hl** (2147)...**Cin**^{5}...**Cin**^{6}...**Com** (**X**)...**A** (3584) (*Bul. L. O.* No. 11)...]

(See p. 1073)

30 47 **5849.** **H 4456.** In *O. Arg. S.* 7 m. The only measure is:

1868.25	122°.8	20″.94	1*n*	Hd

31 22 **5851.** **Hu 728.** The mean of the measure given in Part I and two later measures is:

1904.21	106°.7	0″.32	1*n*	Hu

[**Hu** (*Bul. L. O.* No. 65)...]

5852. **H 1192.** "Duplex, Cl. III" in *O. Arg. S.*, each 8-9 m. The only measure is this: 31^m 32^s

1904.34	358°.8	13″.68	1*n*	β^6	8.5...8.8

5853. **H 183.** "*Red : bluish.*" In W^1 8 m. No measures. 31 48

5854. **Σ 1559.** Without change. 32 5

1871.08	322°.7	1″.97	5*n*	Δ
1898.47	321.8	1.94	2*n*	Coleman

[**Ma** (*F. S.* **I**)...**H**^{1}...**Wr**...**Se**...**Ra** (**XXVI**)...**Δ** (1119)...**Δ** (**I, II**)...**Bl** (**V**) **Do** (3023) (*Trans. R. I. Acad.* **XXIX,** Part 13)...*Annals Toulouse Obsy.* **III** ...**Coleman** (*Mem. R. A. S.* **LIV**)...]

(See p. 107

5855. **Σ 1560.** **B. A. C. 3955.** Fixed. 32 15

1866.28	279°.5	4″.92	3*n*	Δ
1880.25	280.1	5.04	2*n*	β

[**Ma** (*F. S.* **I**)...**Ma** (**XI**)...**H** (**IV**)...**Δ** (**II**)...**LM**...**Cin**^{5}...**β**^{3}...]

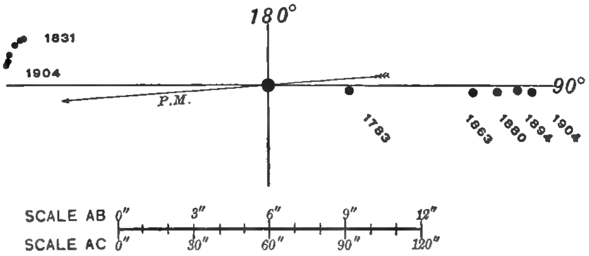
5857. **H 506.** "Large star red." There is no such star in Herschel's place (+38°51′) in any of the star catalogues. Looked for several times with the 6-inch, and certainly not here. There is a 7 m star 1° north, W^2 XI. 598, which is probably the star referred to by H, but the companion not seen with the 6-inch. That star is yellow rather than red. Recently measured with the 40-inch. There is no doubt of this being H 506, there being an error of 1° in the declination given by Herschel. The corrected place is given in Part I. 32 27

1902.19	143°.1	30″.47	2*n*	β^6	7.0...12.2

5858. **Σ 1561.** (= **H III. 87.**) The principal star has a large proper motion: 32 29

Porter	0″.670 in 274°.0
A. G. Bonn	0.659 in 273.3

The motion of the companion is practically rectilinear, and this may be a system of the 61 *Cygni* type.



Σ 1561

1831.68	266°.0	10″.46	4*n*	Σ
1857.36	264.9	10.40	2*n*	Se
1866.11	263.5	10.37	3*n*	Δ
1885.30	261.4	10.20	2*n*	Per
1896.40	260.0	10.03	3*n*	A
1904.07	259.4	9.91	2*n*	β

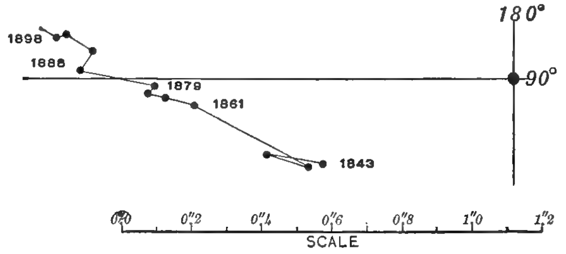
There is a distant 10m star, first measured by H, and not in Σ, which does not belong to the system.

1783.09	86°0	32″35	1*n*	H
1863.99	87.7	81.27	1*n*	Δ
1880.10	88.1	90.94	2*n*	Bl
1894.51	88.7	99.41	2*n*	Eng
1904.07	88.4	105.13	2*n*	β

If this distant star is fixed in space, which is likely to be the fact, the measures indicate that the proper motion of A, from meridian observations, is too large.

[Ma (*F. S.* I)... Ma (**XI**)... H¹... H (**IV, V**)...Wr...Se...OΣ (**IX**)...Δ (1206)...Δ (**I, II**)... Bl (**V**)... Per... Per (2748)... Kapteyn (2935) parallax... Eng (**III**)...A (3395)...*Annals Toulouse Obsy.* **III**...β⁶...]

5859. OΣ 237. Possibly a binary system, but the apparent movement of the companion is so far rectilinear. 32^m 34^s



OΣ 237

1843.33	294°1	0″60	2*n*	Ma
1845.82	287.0	0.74	4*n*	OΣ
1847.40	293.2	0.64	5*n*	Ma
1861.68	274.9	0.92	3*n*	OΣ
1867.51	273.1	1.00	4*n*	Δ
1871.01	272.4	1.05	4*n*	Δ
1879.39	271.4	1.03	3*n*	Hl
1888.32	269.0	1.24	3*n*	Hl
1893.41	266.4	1.21	3*n*	Lewis
1897.40	264.7	1.29	3*n*	Brown
1898.25	265.1	1.31	5*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)... Do (2330)...WS²... En (2678)... Hl (**I, II**)... Sp (2133)... Sp (**II**)... Δ (**I**)... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 502; **LXII**, 383; **LXIII**, 403)... Big (*Bul. Ast.* **XII**, 299)... Brown (3645).... Hu (*Pub. L. O.* **V**).... HΣ (**XII**).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...Biesbroeck...]

5862. Σ 1563 *rej.* Place and measures from H (V). Magnitudes in *Catalogus Novus*, 8...10; in DM 7.8. 32 54

1902.29 157°1 13″54 2*n* Espin 8.6...10.8

[Espin (*Mon. Not.* **LXII**, 532)...]

5865. Weisse 27. "Duplex 5″" in Weisse. I examined this star with the 6-inch in 1874, and found it single. As it is noted in *A. G. Berlin*, "Comp. 9m, 1″–2″?", it was observed again on two nights in 1901 with the 40-inch, and no companion seen. Miller found it single in 1902. In view of the meridian circle observations, this star should be watched hereafter. It is about 1^m preceding 93 *Leonis*. 33 17

[Miller (*A. J.* 546)...β⁵...]

5866. Σ 1564. (= S 630.) Without change. 33^m 21^s

1869.86	86°5	4″92	5*n*	Δ
1895.33	82.6	5.04	3*n*	Coleman
1904.33	87.4	5.21	3*n*	Howard

[Ma (*F. S.* I)... Ma (**XI**)... H (**II**)... Se³...Δ (**II**)... Coleman (*Mem. R. A. S.* **LIII**)...Glasenapp (**V**)...]

5867. Σ 1565. Unchanged. 33 23

1867.98	304°3	21″54	4*n*	Δ
1890.21	304.1	21.28	4*n*	Giacomelli

[OΣ (**IX**)....En....Ra (**XXIII**)....Δ (1206)....Δ (**I, II**)....Per....Per (2684).... Glasenapp (**III, V**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

5870. *Crateris* 79. β 1078. Discovered with the 36-inch. This is a naked-eye star, Heis 6-7m; Gould 6.2. Lalande 22102. The only later position is the following: 33 47

1898.25 51°8 8″11 3*n* A 6.0...13.5

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...A (3584)...]

5874. Σ 1566. No motion. 34 24

1869.08	348°5	2″74	4*n*	Δ
1901.32	350.2	2.49	1*n*	β
1902.38	346.8	2.71	2*n*	Hu

[Ma (*F. S.* I)...Ma (**X**)...Δ (**II**)... Pt...Cin⁵... Bryant (*Mon. Not.* **LX**, 502)...β⁶...]

5878. Σ 3073. Distance and angle increasing. The motion is apparently rectilinear. 34 43

1831.76	45°7	10″73	2*n*	Σ
1870.76	50.9	11.21	4*n*	Δ
1897.41	54.3	12.42	3*n*	Doo
1904.05	56.3	12.50	2*n*	β

[Ma (*F. S.* I)...Δ (1736)...Δ (**II**)...Cin⁵...Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

5879. H 187. "Points to *n* of 10m star." Place reduced from H (VII). 34 57

5880. H 2581. "Could not quite define it; night not good." Herschel's place is substantially that of the 9.5m star, DM (23°) 2374. On two nights in 1901 and 1903 I could not find here with the 40-inch anything corresponding to Herschel's description. 35 23

5881. β 792. Discovered with the 15½-inch at the Washburn Observatory. Apparently fixed. 35 32

1888.35	199°2	1″94	4*n*	Com
1898.20	198.9	2.23	3*n*	Doo
1898.27	202.7	2.19	3*n*	A
1901.21	200.6	2.19	2*n*	Doo

[β (**XII**)....β²....Com (*Pub. Washburn Obsy.* **VI**).... Doolittle (*Pub. Flower Obsy.* **I, II**)...A (3584)...]

35^m 53^s **5882. H 508.** Degree of Decl. uncertain in H; examined and identified as here given. No evidence of change.

1828.33	131°.7	8″.00	1*n*	H	8–9...9–10
1879.26	127.7	11.21	1*n*	β	8.3...9.0
1880.23	129.1	11.72	2*n*	Big	8.0...9.5
1904.05	128.5	11.39	2*n*	β	8.9...9.8

[H^1...β^3...Big...β^6...]

36 20 **5884. Σ 1567.** Probably unchanged.

1867.83	80°.7	3″.50	3*n*	Δ
1905.05	80.0	3.37	1*n*	β

[Ma (*F. S.* I)...Δ (II)...β^6...]

37 8 **5885. Σ 1568.** Fixed.

1867.61	221°.9	9″.02	3*n*	Δ

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Cin^5...Glasenapp (II)...*Annals Toulouse Obsy.* III...]

37 24 **5887. Espin 123.** The only other measures are by Biesbroeck:

AB	1903.43	205°.4	6″.60	2*n*	B	9.3...9.6
AC	1903.43	275.3	43.68	1*n*	B	...9.6

[Espin (*Mon. Not.* LXIII, 173)...Biesbroeck...]

37 25 **5888. β 917.** Discovered with the 18½-inch. There is no change.

1892.24	177°.1	3″.59	3*n*	β
1898.32	176.3	3.63	3*n*	A

[β (XIII)...β^3...β (3142)(*Pub. L. O.* II)...Collins (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...A (3585)...Doolittle (*Pub. Flower Obsy.* I)...]

37 26 **5889. β 793.** Discovered with the 15½-inch at the Washburn Observatory. The apparent change in the angle may not be real.

1888.35	113°.1	1″.66	3*n*	Com	9.2...10.8
1898.21	112.5	1.62	4*n*	Doo	9 ...10+
1898.40	111.2	1.58	3*n*	A	9.5...10.3
1904.14	112.2	1.45	3*n*	Doo	

[β (XII)....β^2....Com (*Pub. Washburn Obsy.* VI)....Doolittle (*Pub. Flower Obsy.* I, II)...A (3585)...]

37 32 **5892. H 2583.** Nothing since Herschel but the following:

1880.23	56°.2	30″.20	2*n*	Big	9...9

37 58 **5894. Σ 1569.** Fixed.

1868.75	324°.8	3″.61	4*n*	Δ
1905.05	324.8	3.68	1*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...β^6...]

37 58 **5895. OΣ 239** *rej.* Fixed.

1896.40	20°.6	37″.78	3*n*	A

[Δ (I)...A (3395)...Hu (*Pub. L. O.* V)...]

5896. H 3334. "In field with nebula." In O. Arg. N. 7 m. The only measures are: 38^m 15^s

1904.10	156°.0	44″.51	2*n*	β^6	7.9...11.6

5898. A 140. No other measures. 38 22

[A (3741)(*Bul. L. O.* No. 3)...]

5901. Σ 1570. (= **H** 2584.) Fixed. 39 11

1866.92	49°.3	10″.58	3*n*	Δ
1905.05	49.3	10.71	1*n*	β

[Ma (XI)...Ma (*F. S.* I)...Δ (II)...β^6...]

5902. Cordoba. "Double" in Cordoba Zones. Measures by β^6. 39 17

5906. Σ 1571. No material change. 40 11

1868.58	298°.3	9″.54	4*n*	Δ
1905.06	297.4	10.02	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Cin^6...β^6...]

5908. Kr 40. "Double" in *A. G. Hels.* 40 17

1898.37	271°.6	3″.39	3*n*	Doo

[β (3042)(*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

5911. Σ 1572. Unchanged. 40 38

1866.99	288°.4	10″.31	3*n*	Δ
1901.82	289.1	10.20	2*n*	Espin

[Ma (*F. S.* I)...Ma (XI)...H (V)...Δ (II)...Cin^5...Espin (*Mon. Not.* LXII, 529)...]

5912. β 602. Discovered with the 18½-inch. The measures are insufficient to decide as to the question of motion. It has been a more difficult pair than the magnitudes and distance would indicate. The later measures are: 40 39

1891.30	80°.0	0″.47	3*n*	β
1898.44	76.9	0.43	1*n*	A
1901.37	81.7	0.55	1*n*	Doo

[β (X)..β^1...β (3114)(*Pub. L. O.* II)...A (3585)...Doolittle (*A. J.* 547)...]

5915. Sh 130. B is W^2 XI, 788. The only observation since 1823 is: 41 16

1905.07	27°.1	74″.28	2*n*	β^6	7.8...9.2

5916. See 135. The principal star has a proper motion of 0″.34 in 180° (Bossert). 41 16

[See (*A. J.* 431)...]

5917. Hu 729. With two later measures the mean is: 41 29

1904.13	359°.5	1″.49	3*n*	Hu	7.0...12.2

[Hu (*Bul. L. O.* No. 65)...]

$41^m\ 33^s$ **5918.** **H 1198.** H (V) 121°.4 : 12″ : 9...14. "Surely this star must have changed." Identified and measured:

1904.09	103°.0	11″.75	2*n*	β^6	8.3...11.6

41 45 **5919.** 4 *Virginis.* **Sh 131.** (= **𝕳 VI. 113** = σ 394.) 𝕳 gives the distance of one, 205″.73 (1783.32) 1*n*, but no angle. Sadler has shown (*Mon. Not.* XLV, 325), after an examination of his original MS. in the Royal Astronomical Society, that the 𝕳 distance should have been printed 145″.73. The only modern observation is:

1905.28	355°.8	151″.75	1*n*	β^6

This is called ξ *Virginis* in Sh. That star is $3^m\ 40^s$ *p* 4 *Virginis.* The proper motion of the latter is 0″.052 in 98°.8 (Auwers).

41 48 **5921.** 93 *Leonis.* **Σ 7, App. II.** (= **𝕳 VI. 80** = σ 393 = **Sh 129.**) Relatively fixed, but common proper motion of 0″.173 in 274°.0 (Auwers).

1868.47	355°.4	74″.12	5*n*	Δ
1877.64	355.4	74.37	4*n*	Je
1895.37	355.2	74.35	2*n*	Gla

The principal star is a spectroscopic binary, discovered by Campbell (*Astrophysical Jour.* XII, 254).

[Δ (**II**)...Pk...Je (2347)...Engelhardt (**II**)...Glasenapp (**IV**)...]

41 52 **5922.** **Σ 3074.** (= **H 841.**) Without change.

1868.31	302°.0	10″.65	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...Cin^5...]

42 18 **5924.** **𝕳 VI. 115.** The place in 𝕳 is in error 2^m R. A and 5′ Decl.; examined and identified as here given. The companion is SD (9°) 3368. The principal star has a proper motion of 0″.210 in 234°.8 (Porter). Nothing since Herschel but the following:

1903.27	69°.5	83″.92	2*n*	β^6	6.5...8.6

42 28 **5926.** **β 603.** **B. A. C. 3992.** Discovered with the 18½-inch. This star is 1134″.3 from β *Leonis* in the position-angle of 201°.5 (1864.4) Knott. In B. A. C. 6½ m; DM 7.0. Certainly binary in slow retrograde motion. A more rapid change in the angle may be expected. Porter gives this star a proper motion of 0″.141 in the direction of 284°.4. Some of the measures are:

1878.21	337°.2	1″.52	2*n*	β
1880.28	335.7	1.13	2*n*	β
1886.28	324.4	1.33	2*n*	HΣ
1891.26	328.7	1.16	3*n*	β
1894.85	324.7	1.16	2*n*	Barnard
1897.33	321.2	0.88	3*n*	Lewis
1897.34	320.9	1.07	3*n*	A
1901.27	313.2	0.80	3*n*	Doo
1903.33	313.4	0.83	3*n*	Lewis
1903.39	314.6	0.95	7*n*	Doo

[β (**X**)...β^1...β^3...β (*Mon. Not.* **XXXVIII**, 408)...β (3114) (*Pub. L. O.* **II**)...Ho (2978)...Lv^1...Sp (**III**)...Kn...A (3465)...Barnard (*A. J.* 447)...HΣ (**XII**)....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXIII**, 403; **LXIV**, 797)...]

5927. **Σ 1573.** (= **S 631.**) Fixed. $42^m\ 38^s$

1869.53	177°.7	11″.08	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIV**)...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (1206)...Δ (**I, II**)...*Annals Toulouse Obsy.* **III**...]

5929. **β** *Leonis.* **β 604.** The faint star, C, was noted with the 18½-inch. The change in its position is due to the proper motion of the large star. Auwers gives this, 0″.522 in the direction of 258°.7. 42 56

The fainter attendant, B, was added by Aitken with the 36-inch. He calls it exceedingly faint and difficult with that instrument.

A and B

1898.40	346°.2	39″.74	3*n*	A	...15.5

A and C

1892.19	349°.0	78″.10	2*n*	β
1898.34	351.2	79.36	1*n*	β
1898.40	351.4	78.89	3*n*	A

[β (**X**)....β^1....β (*Mon. Not.* **XXXVIII**, 408)....β (3142) (*Pub. L. O.* **II**)....A (3585)...]

5932. **H 510.** The only observation since Herschel is: 44 6

1880.28	252°.5	25″.41	1*n*	Big	10.5...10.8

5934. **H 4477.** Not in *O. Arg.* I found the stars fainter (1876) than given by H. The magnitude in SD is 9.2. 44 20

5935. **H 1201.** **B. A. C. 4005.** "Small star *red.*" In Heis and Arg. U. N. 6 m. H (V) 7...15. Small star not red (1903). 44 48

1877.25	190°.7	15″.03	1*n*	OΣ	6.5...11
1878.24	190.0	14.75	1*n*	β	
1882.73	190.0	14.76	3*n*	Ho	6.3...12
1903.27	190.1	14.97	2*n*	β	6.3...11.5

[β^1...Ho (2978)...OΣ (**X**, p. 132)...HΣ (**XII**)...β^6...]

5936. **Σ 1574.** Without change. 44 58

1867.67	6°.1	8″.95	3*n*	Δ
1905.05	5.7	9.33	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...β^6...]

5938. **Hu 730.** With a later measure the mean is: 45 7

1903.88	47°.5	0″.21	2*n*	Hu	9.3...9.3

[Hu (*Bul. L. O.* No. 65)...]

5939. **H 191.** "Their direction makes an angle of 75° with a star *nf.*" 45 8

$45^m\ 37^s$ **5941.** **H 842.** "Very beautiful close pair." The magnitude in DM is 7.9. The only measures are:

1882.90	89°6	3″52	2*n*	Ho	8.0...8.2

[Ho (2978)...] (See p. 1074)

45 43 **5942.** **Hu 731.** With two later measures the mean is:

1904.13	116°5	0″34	3*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

45 48 **5944.** **Σ 1575.** (= **H** IV. 49 = **S** 632.) Fixed.

1866.52	209°8	30″70	3*n*	Δ
1890.21	209.9	30.26	4*n*	Giacomelli

[Ma (*F. S.* **I**)....Ma (**IX, X, XI, XIII, XV**)....H (**VII**)....En....Ra (**XXIV**).... Δ (1206)... Δ (I, **II**)...Gl...Sp (**II**)...Glasenapp (**II, III**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

46 15 **5948.** **Σ 3075.** (= **H** 2589.) Unchanged.

1867.55	4°6	17″84	3*n*	Δ
1879.34	3.7	17.91	1*n*	Cin

[Δ (**II**)...Cin⁵...]

46 35 **5949.** **Sh 132.** (= **H** V. 60 = σ 397.) Apparently unchanged. The large star has a proper motion of 0″046 in 159°8 (*A. G. Berlin*), and the companion is evidently moving with it.

1783.09	19°2	37″25	1*n*	H	
1847.81	14.1	38.94	4*n*	OΣ	7.3... 9.2
1881.36	13.8	39.07	1*n*	β	
1904.05	14.3	38.84	2*n*	β	...10.0

[H (**VI**)...OΣ (**X**)...Cin⁵...β⁴...β⁶...]

46 40 **5950.** **Σ 1576.** Fixed.

1869.15	243°2	5″36	4*n*	Δ
1898.34	241.7	5.41	2*n*	Gla

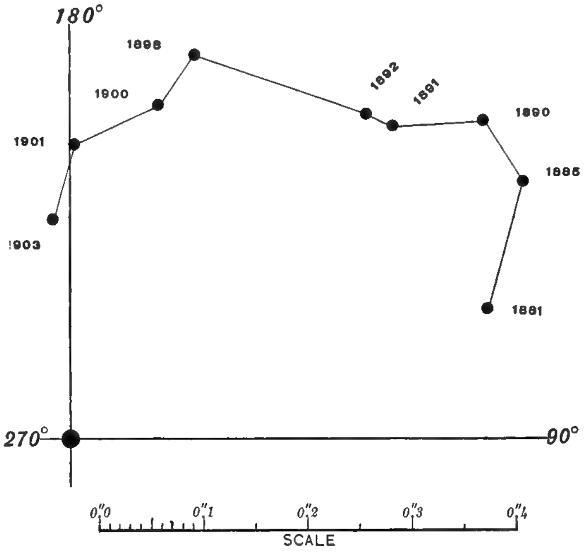
[Ma (*F. S.* **I**)... Ma (**XI**)...H (**V**)...Se...Se³...Δ (**II**)...Glasenapp (**V**)...]

47 2 **5951.** **β 794.** The close pair was discovered with the 15½-inch at the Washburn Observatory. A naked-eye star in *Draco;* Heis 6-7m; DM 6.7. This is in rapid orbital motion, and will probably have a short period. The following are all the measures:

A and B

1881.34	106°6	0″42	5*n*	β
1885.85	119.0	0.50	3*n*	HΣ
1889.37	133.3	0.41	2*n*	Com
1890.35	126.9	0.50	4*n*	β
1891.30	133.4	0.43	3*n*	β
1892.15	136.9	0.42	3*n*	β
1892.40	135.7	0.4±	1*n*	Sp
1898.31	160.7	0.37	2*n*	β
1898.56	162.6	0.40	3*n*	A
1899.33	169°9	0″33	2*n*	Brown
1900.30	164.8	0.33	2*n*	A
1901.53	179.0	0.28	2*n*	A
1902.79	184.1	0.43	4*n*	Doo
1903.33	184.5	0.21	1*n*	A
1903.70	190.2	0.33	6*n*	Biesbroeck
1905.27	206.4	0.20	2*n*	A

The last measure, by Aitken, was received after the diagram was made.



β 794

The distant companions, C and D, were added with the 36-inch, but C had been seen by HΣ in measuring AB. Thus far the positions are unchanged.

AB and C

1886.34	71°5	5″70	1*n*	HΣ
1891.72	72.7	5.60	6*n*	β
1898.31	73.6	5.55	2*n*	β
1898.57	72.1	5.36	3*n*	A

AB and D

1898.57	78°4	27″12	3*n*	A

[β (**XII**)...β²...β (3048, 3114, 3142) (*Sid. Mess.* **IX**, 299) (*Pub. L. O.* **II**)...Com (*Pub. Washburn Obsy.* **VI, X**)...Sp (**III**)...HΣ (**XII**)...A (3585) (*Bul. L. O.* No. 11)...Brown (3645)...Biesbroeck...Doolittle (*Pub. Flower Obsy.* **II**)...]

5952. **Σ 1577.** Fixed. $47^m\ 9^s$

1867.67	10°3	8″40	3*n*	Δ
1902.38	10.8	8.61	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**V**)...]

5953. **H 4479.** "Neat star." In O. Arg. S. 8 m. 47 16

1880.36	93°4	6″87	1*n*	Cin	8.0...9.5
1882.23	90.3	7.19	2*n*	Wilson	8.2...9.0

[Cin⁶...Wilson (Cin¹⁰)...]

47m 16s **5954.** **Σ 1578.** No material change.

1869.05	165°6	3″26	4*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se³...H (**IV**)...Gl...WS²...Δ (**II**)...]

47 23 **5955.** **OΣ 240.** Without change.

1867.31	318°7	8″59	3*n*	Δ
1898.35	318.5	8.75	5*n*	Hu

[OΣ (**IX**)...Ma (**XI, XIII**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

7 38 **5957.** **A 75.** Later measures are:

1901.53	205°0	0″26	2*n*	A

[A (3668)(*Pub. A. S. P.* **XII**, 128)(*Bul. L. O.* No. 11)...]

47 45 **5958.** **Hn 113.** No other measures.

[*Pub. Washburn Obsy.* **II, VI**...]

47 59 **5959.** **H 512.** Dembowski measured AC only.

AB	1897.38	161°4	19″70	3*n*	Doo	8.0...12.0
AC	1874.18	327.9	28.76	2*n*	Δ	9.0... 9.1
	1897.38	328.7	28.27	3*n*	Doo	... 9.0

[Δ (I)...Doolittle (*Pub. Flower Obsy.* I)...]

48 27 **5960.** **OΣ (App) 112.** B is W² XI. 921. The proper motions of these stars are given:

A = 0″494 in 272°3 *A. G. Berlin*
0.563 in 273.3 Rechenberg
B = 0.450 in 270.0 *A. G. Berlin*
0.490 in 269.4 Rechenberg

The real movement must be the same, as there has been no relative change.

1903.10	35°5	73″19	4*n*	β

[Δ (I)...Franz (3464)...Rechenberg (3482)...β⁶...]

48 51 **5962.** 65 *Ursae Majoris.* **Σ 1579.** (= **H I. 72 = Sh 133 = Σ 20, App. I = OΣ (App) 113.**) Without change. The principal star has a proper motion of 0″011 in 318°3 (Auwers).

A and B

1866.34	37°8	3″69	3*n*	Δ
1887.34	38.4	3.91	3*n*	Hl
1901.41	37.6	3.68	2*n*	Maw

A and C

1868.27	113°7	63″13	4*n*	Δ

[Ma (**XI**)...Wr...Se... Ra (**XXVI**) ...Bl (**V**)...Je (2338, 2347)...Δ (**II**, pp. 276, 577)...Franz (3080)...Hl (**II**)...Glasenapp (**III**)...Maw (**IV**)...]

49 19 **5964.** **H 2591.** Nothing since Herschel but this:

1904.08	162°0	42″30	3*n*	β⁶	9.0...12.8

5965. **Σ 1580.** Fixed. Σ speaks of a 12 m star, not measured. This was readily seen with the 6-inch, and estimated as 20″ from B in the direction of 250°. 49m 21s

1866.54	261°3	8″44	3*n*	Δ
1904.37	260.8	8.77	1*n*	Hu

[Ma (*F. S.* **I**)...WS²...Δ (**II**)...Glasenapp (**II**)...]

5967. 95 *Leonis.* **H VI. 13.** (= σ 399.) All the stars in the field are much more than 90″ distant (1904). DM (16°) 2320, which is 32ˢ *f* and 5′3 *n*, is a wide pair, 94°0 : 96″70. 95 *Leonis* has a proper motion of 0″019 in 342°3 (Auwers). 49 30

5968. **Σ 1582.** Fixed. The principal star has a proper motion of 0″069 in 270° (*A. G. Berlin*). 49 51

1868.53	76°3	11″64	4*n*	Δ
1904.07	76.7	11.91	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**II**)...β⁶...]

5969. **Σ 1581.** Fixed. 49 53

1867.16	173°5	2″41	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...] (See p. 1074)

5970. **OΣ 241.** There may be an increase in the angle, but the change is very slow. 50 6

1871.29	121°5	1″55	6*n*	Δ
1880.37	126.1	1.55	1*n*	β
1884.20	125.7	1.50	4*n*	Per
1898.22	127.2	1.54	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Da³...Du...En (2678)...β³...Per...Per (2685)...Δ (I)...Knorre (3518)...Maw (**III**)...Brown (3645)...Hu (*Pub. L. O.* **V**)...Sk⁵, p. 108...]

5971. **Σ 1585.** No motion. 50 29

1869.00	105°2	5″34	4*n*	Δ

[Ma (*F. S.* I)...Ma (**XI**) ...Δ (**II**)...] (See p. 1074)

5972. **Σ 1584.** (= **H 194.**) Fixed. 50 30

1867.90	188°2	12″95	3*n*	Δ
1904.37	188.3	13.11	1*n*	Hu

[Ma (*F. S.* I)...Δ (**II**)...]

5973. **Σ 3076.** No change. 50 30

1867.63	54°5	5″71	3*n*	Δ

[Ma (*F. S.* **II**)...Δ (**II**)...]

5974. **β 918.** Discovered with the 18½-inch. In Heis and Argelander as a naked-eye star, 6.7 m (*Ursa Major*). Three faint nebulae in a low-power field *p*. The later measures are: 50 36

1891.22	234°3	7″33	3*n*	β
1899.13	230.8	7.21	2*n*	β
1901.38	233.5	7.35	3*n*	Doo

[β (**XIII**)...β³...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

50^{m} 42^{s} **5975. Σ 1586.** No material change.

1869.07	250°5	1″59	4*n*	Δ
1879.24	249.9	1.60	1*n*	β
1900.12	250.8	1.59	3*n*	Lewis

[Ma (*F. S.* I) . . . Ma (XI) . . . Δ (II) . . . β^{3} . . . Lewis (*Mon. Not.* LX, 503; LXII, 383) . . .]

(See p. 1074)

50 52 **5976. Hu 732.** Measured since Part I was in type:

1904.81	356°4	1″39	2*n*	Hu	9.3 . . . 12.0

[Hu (*Bul. L. O.* No. 65) . . .]

51 12 **5977. H 4481.** "Fine star." Apparently fixed.

1879.00	195°9	3″24	6*n*	Cin
1897.34	198.0	3.28	2*n*	Scott

[Cin^{3} . . . . Cin^{5} . . . . Cin^{6} . . . . Wilson (Cin^{10}) . . . . Glasenapp (II) . . . . Scott (*Brit. Ast. Ass'n* VIII, 66) (*Mon. Not.* LXIV, 52) . . . Do (3799) . . .]

51 49 **5979. Ho 379.** Fixed.

1905.21	244°0	14″77	3*n*	Doo

[Ho (3233) . . .]

51 50 **5980. Hu 733.** Measured since Part I was in type:

1904.75	160°8	1″90	3*n*	Hu	8.5 . . . 10.3

[Hu (*Bul. L. O.* No. 65) . . .

52 59 **5982. Σ 3077** *rej.* Description from H (VII). The only measures are:

1904.07	47°1	8″56	2*n*	β^{6}	9.6 . . . 11.6

53 7 **5983. β 919.** Discovered with the 18½-inch. A naked-eye star in *Ursa Major* (Heis). Magnitude in DM 6.0. The later measures are:

1891.22	14°3	4″60	3*n*	β
1899.11	15.7	4.30	2*n*	β
1901.35	12.9	4.46	3*n*	Doo

[β (XIII) . . . β^{3} . . . β (3114) (*Pub. L. O.* II) . . . Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* II) . . .]

53 18 **5985. Ho 534.** The principal star has a proper motion of 0″129 in 76°6 (*A. G. Berlin*).

1905.18	139°6	9″91	1*n*	β

[Ho (3557) . . . β^{6} . . .]

53 22 **5986. Σ 1583.** (= **OΣ** 238 *rej.*) Fixed.

1865.82	283°4	11″03	3*n*	Δ
1899.61	283.1	11.34	3*n*	Hu

[Ma (*F. S.* I) . . . OΣ (IX) . . . Δ (II) . . . Do (3023) (*Trans. R. I. Acad.* XXIX, Part 13) . . . Hu (*Pub. L. O.* V) . . .]

5988. OΣ 243. Probably unchanged. 53^{m} 38^{s}

1867.96	8°8	0″90	3*n*	Δ	8.3 . . . 9.0
1898.22	8.6	0.90	3*n*	Hu	

[Ma (XI, XIII) . . . Δ (I) . . . OΣ (IX) . . . Sk^{3} . . . β^{1} . . . Brown (3645) . . . Hu (*Pub. L. O.* V) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

5990. β 795. (AC = **OΣ** 242 *rej.*) The faint companions to the wide pair of OΣ were noted with the 15½-inch at the Washburn Observatory. These stars are fixed. 53 51

A and B

1885.61	329°3	14″44	2*n*	HΣ
1888.40	327.2	14.44	2*n*	Com
1896.43	328.0	14.39	3*n*	A

C and D

1885.61	116°3	6″06	1*n*	HΣ
1888.32	116.0	5.58	2*n*	Com
1896.43	114.0	6.25	3*n*	A

A and C (= OΣ 242 *rej.*)

1881.30	150°9	33″59	3*n*	β
1885.61	150.7	33.52	1*n*	HΣ
1896.58	150.9	33.49	3*n*	Eich

[β (XII) . . . β^{2} . . . Com (*Pub. Washburn Obsy.* VI) . . . A (3395) . . . Δ (I) . . . Eichelberger (*A. J.* 397) . . . HΣ (XII) . . . Hu (*Pub. L. O.* V) . . .]

5991. Hu 734. With two later measures the mean is: 53 57

1903.37	189°7	3″74	3*n*	Hu	9.1 . . . 10.3

[Hu (*Bul. L. O.* No. 65) . . .]

5992. H 513. In W^{2} 9m. Rather more than one magnitude difference (1876). 53 58

1905.18	252°9	21″41	1*n*	β^{6}	8.5 . . . 10.8

5993. OΣ (App) 114. B is W^{2} XI, 1037. No change. 54 0

1905.22	81°2	86″89	1*n*	β

[Δ (I) . . . Franz (3080) . . . β^{6} . . .]

5994. H 2592. "Very neat." In another observation H gives P = 4°3. 54 18

5995. H 4489. "Neat star." In SD 8.5 m. The only measure is: 54 20

1879.33	152°5	9″88	1*n*	Cin^{6}	8.5 . . . 9.0

5996. Σ 1589. Probably fixed. 54 26

1868.66	158°3	2″25	3*n*	Δ

[Ma (*F. S.* I) . . . Ma (XI) . . . Δ (II) . . .]

54^m 34^s **5998.** **β 1079.** Discovered with the 36-inch. In Gould 6.5 m (*Corvus*). No motion.

1898.26	148°3	11″55	1*n*	See
1900.11	146.4	11.88	2*n*	A

[β (XV) . . . β (2929) (*Pub. L. O.* **II**) . . . See ( ) . . . A (*Bul. L. O.* No. 11) . . .]

54 40 **5999.** **A 141.** No other measures.

[A (3741) (*Bul. L. O.* No. 3) . . .]

55 15 **6002.** **β 457.** Discovered with the 6-inch. Probably without change.

1883.80	81°4	1″05	1*n*	W	8.5 . . . 9.2
1886.30	81.3	1.18	1*n*	LM	8.0 . . . 10.0
1898.24	82.1	1.24	2*n*	D	8.0 . . . 9.0
1898.26	80.1	1.18	3*n*	A	8.2 . . . 9.8

[β (**IX**) . . . β (*Mon. Not.* **XXXVIII**, 78) . . . Hl (I) (2147) . . . LM . . . Wilson (Cin^{10}) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . A (3585) . . .]

55 19 **6003.** **Σ 1591.** (= **OΣ (App) 115.**) Struve speaks of a 12 m star 20″ distant in 50°. The only measure of this is:

1905.18	52°6	23″88	1*n*	β

Change in the bright stars uncertain.

1868.49	353°0	53″68	4*n*	Δ
1889.30	352.8	52.59	2*n*	Gla
1905.18	352.8	52.57	1*n*	β

[Ma (*F. S.* **I**) . . . En . . . Δ (**II**) . . . Je (2347) . . . Glasenapp (**III**) . . . *Annals Toulouse Obsy.* **III** . . . β^{6} . . .]

55 28 **6004.** **Σ 1590.** Fixed.

1867.94	236°5	5″06	3*n*	Δ
1879.32	237.0	4.93	1*n*	Cin

[Ma (*F. S.* **I**) . . . . Δ (**II**) . . . . Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . . Cin^{5} . . . .]

55 48 **6005.** **OΣ (App) 116.** Probably unchanged.

1905.18	181°2	74″19	1*n*	β

[Δ (**I**) . . . β^{6} . . .]

56 6 **6006.** **Σ 1588.** The change is due to proper motion.

1831.59	60°7	16″49	2*n*	Σ
1864.27	57.7	15.27	5*n*	Δ
1889.47	54.4	14.73	3*n*	Hl
1890.53	54.5	14.67	2*n*	HΣ
1905.29	53.5	14.06	1*n*	β

[Ma (*F. S.* **I**) . . . H (**V**) . . . Δ (1574) . . . Δ (**II**) . . . Flm . . . Hl (**II**) . . . Seagrave (*Sid. Mess.* **II**, 22) . . . HΣ (**XII**) . . . β^{6} . . .]

56 21 **6007.** **Ho 535.** Probably fixed.

1903.31	143°0	2″17	3*n*	Doo

[Ho (3557) . . .]

6011. **H 515.** "Triple." The angle is about 160°; third star not seen with 6-inch (1876), but poor night. 56^m 48^s

6012. **β 1323.** (AC = **Σ 1594.**) The close companion was detected with the 40-inch in measuring the Struve stars. No other measures of this. 57 21

The change in AC appears to be due to proper motion.

1831.93	165°0	16″95	2*n*	Σ
1867.39	162.6	15.42	3*n*	Δ
1879.26	160.4	15.22	1*n*	β
1886.40	159.8	15.17	4*n*	Hl
1903.19	158.1	14.46	4*n*	β

These positions give for the most probable movement of the principal star, 0″043 in the direction of 200°5.

There is a more distant fourth star of about the same magnitude as the close component, which is not mentioned by Struve. The only measures are:

1886.40	77°3	25″15	2*n*	Hl
1903.20	76.0	25.02	3*n*	β
1904.42	76.3	25.64	4*n*	Doo

Like C, it is probably only an optical companion, but the measures do not cover a sufficient time to make this certain.

[Ma (*F. S.* **II**) . . . Δ (1800) . . . Δ (**II**) . . . WS . . . WS^{2} . . . Gl . . . Flm . . . Hl (*Wash. Obsns.* 1886) . . . Hl (**II**) . . . . β^{3} . . . Com (*Pub. Washburn Obsy.* **X**) . . . Eichelberger (*A. J.* 397) . . . β (*Mon. Not.* **LXIII**, 421) . . . Do (3930) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

6013. **Σ 1593.** Relatively fixed. The angles of Se and Ma are erroneous. Dembowski and Glasenapp make the north star the brightest. The latter measures a star 11.8 m, 1°5 : 52″75 (1893.32) 1*n*. 57 23

1866.62	198°3	1″33	3*n*	Δ	8.1 . . . 8.2
1893.32	200.1	1.14	1*n*	Gla	8.3 . . . 8.4
1898.26	15.8	1.32	3*n*	Doo	8.7 . . . 8.8

[Ma (*F. S.* **II**) . . . Ma (**XI, XV**) . . . Se . . . Sk^{3} . . . Pt . . . En (2663) . . . Hd . . . Δ (**II**) . . . Cin^{5} . . . Cin^{6} . . . LM . . . Wilson (Cin^{10}) . . . Glasenapp (**II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

6015. **A 681.** With two later measures the mean is: 57 36

1904.36	134°2	0″41	3*n*	A	9.0 . . . 9.5

[A (*Bul. L. O.* No. 61) . . .]

6016. **A 682.** The mean of two measures is: 58 4

1904.37	335°7	0″38	2*n*	A	7.6 . . . 8.8

[A (*Bul. L. O.* No. 61) . . .]

6017. **β 458.** Noted with the 6-inch in observing β 457. Relatively fixed. See measures a 14.2 m star nearer, 183°4 : 12″33 (1898.26) 1*n*. Not seen with the 40-inch at the time of the measure in 1899. 58 8

1883.22	233°3	30″53	1*n*	W
1898.26	233.1	30.49	1*n*	See
1898.26	233.0	30.55	3*n*	A
1899.05	232.9	30.38	1*n*	β
1901.39	233.2	30.66	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Wilson (Cin^{10})...See (   )...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

58^m 8^s **6018.** 2 *Comae Berenices.* **Σ 1596.** (= **H II. 47 = Sh 134.**) No material change, but the components have a small common proper motion of 0″023 in 79°8 (Auwers).

1868.04	240°2	3″77	4*n*	Δ
1890.20	237.8	3.64	5*n*	Giacomelli
1897.31	237.1	3.90	3*n*	Doo

[Ma (**IX, X, XI, XIII, XV**)....Ma (324)....Ma (*F. S.* **I**)....H^1....Se....Se^3....Ra (**XXIV**)...Δ (1206)...Δ (I, II)...Wr...Wr (*Phil. Trans.* 1851)...Hd...WS...WS^2...Gl...Du...Ferr...Sk^2...Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (**II**)...Per...Per (2684)...Hayn (3051)...Big...Jones (*A. J.* 312)...Glasenapp (**II, III**)...En (2663)...Doolittle (*Pub. Flower Obsy.* **I**)...Ho (3558)...Coleman (*Mem. R. A. S.* **LIII**)...Giacomelli (**II**)...Knorre (3632)...*Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Thiele (3837)...]

58 10 **6019.** **Σ 1595.** Fixed.

1867.21	328°9	27″51	3*n*	Δ
1879.34	328.3	27.74	3*n*	Sp

[Ma (*F. S.* **I, II**)...Ma (**XI**)...Hd...En...H (**IV, V**)...Gl...Sp (**II**)...Δ (**II**)...]

58 45 **6020.** **Σ 1597** *rej.* Measures from *A. G. Leipzig*, p. 248.

58 57 **6021.** **Σ 1598** *rej.* From *Catalogus Novus*. My estimates are, 45°: 15″: 8.5...10.5 (1874). (See p. 1074)

59 16 **6023.** **H 2595.** "Extremely faint." Not seen once with the 6-inch in 1876, and the 40-inch on two nights in 1901 failed to show any companion.

59 26 **6024.** **H 198.** "*Yellow : blue.*" Colors not prominent with 6-inch (1877). B is W^1 XI. 995, 14^s*f*, and 34″*s*.

59 27 **6025.** **Σ 1600.** (= **S 633.**) Fixed. The components are given a small proper motion of 0″06 in 90° (*A. G. Harvard*).

1869.17	93°5	7″61	4*n*	Δ
1895.37	92.9	7.73	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Ra (**XXIV**)...Du...Δ (1206)...Δ (**I, II**)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...]

59 29 **6026.** **OΣ 244.** Probably unchanged.

1867.96	321°3	3″13	3*n*	Δ	7.8...10.2
1898.35	320.6	3.24	5*n*	Hu	

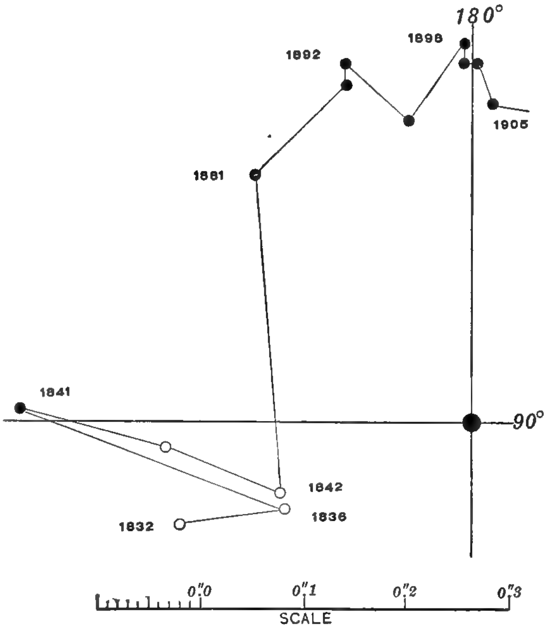
[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

59^m 30^s **6027.** **Σ 1599.** Fixed.

1867.69	167°4	10″07	3*n*	Δ
1904.38	167.1	10.13	3*n*	β

[Ma (*F. S.* **I**)....Δ (**II**)....Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)....OΣ (**IX**)...Cin^5...β^6...]

0 0 **6028.** **Σ 3123.** A binary of long period, in slow retrograde motion. It is always a close and difficult pair, and frequently noted as single, but the measures since 1881 show that an occultation is not likely to have occurred during the period covered by the observations.



Σ 3123

The following are the positive and the negative results:

1832.20	289°7	0″3±	3*n*	Σ
1836.73	295.6	0.2±	2*n*	Σ
1840.43	265±	Obl.	2*n*	OΣ
1841.41	268.7	0.44	1*n*	OΣ
1841.56	275.3	0.3±	1*n*	Ma
1842.78	291.3	0.2±	1*n*	Ma
1851.44	Elong. in 231°?		1*n*	OΣ
1858.44	Single		1*n*	OΣ
1861.26	Single		1*n*	OΣ
1862.39	Single		1*n*	OΣ
1862.95	Single		1*n*	Δ
1868.56	Single		1*n*	OΣ
1881.32	Round		1*n*	Big
1881.38	221.9	0.32	2*n*	β
1890.53	200.7	0.35±	2*n*	HΣ
1892.14	200.0	0.37	3*n*	β

1895.15	192°2	0″30	6*n*	Barnard
1898.53	181.3	0.37	3*n*	A
1900.24	181.4	0.35	1*n*	A
1903.43	179.3	0.35	3*n*	Biesbroeck
1905.22	176.5	0.31	1*n*	A

The third star was added by Barnard with the 36-inch. The only other measures are:

1899.36	310°6	3″13	2*n*	A	...15.7

The 7 m star, DM (69°) 636, which is $5^m 40^s$ *p* and 30′ *n* of Σ 3123, was found to be a close pair by Aitken since Part I was in type. (See No. 13221)

1905.22	227°7	0″30	1*n*	A	7.2...7.7

[Ma (*F. S.* **I**)...Ma (**IX, X**)...OΣ (**IX**)...Δ (1736)...Flm...Big...β^4...β (*Mon. Not.* **LII**, 437) ...β (3142)(*Pub. L. O.* **II**)... HΣ (**XII**)... Barnard (*A. J.* 447) ...A (3585)...A (*Bul. L. O.* No. 11)...Biesbroeck...]

$0^m\ 0^s$ **6029.** **H 4496.** I found magnitudes not more than 9...10 (1876).

1880.36	27°8	12″16	1*n*	Cin	8.0...9.0
1882.11	28.4	12.85	1*n*	W	8.8...9.2

[Cin^6...Wilson (Cin^{10})...]

0 2 **6030.** **Σ 1601.** Perhaps change in angle.

1868.75	314°8	2″23	4*n*	Δ
1901.26	311.6	2.38	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... Δ (**II**)...Cin^5... Greenwich Obsy. (*Mon. Not.* **LX**, 503)...β^5...]

0 45 **6033.** **H 1210.** "Elegant." R. A. in H 1^m too large, but correctly given in H (V), magnitudes 9...13. I found the principal star about 9 m (1876); companion very faint with the 6-inch. The following are all the measures:

1880.33	100°2	6″47	1*n*	Pt	
1904.07	105.7	6.54	2*n*	β^6	8.6...9.9

0 48 **6034.** **Ho 255.** The later measures are:

1893.40	127°1	2″27	2*n*	Ho
1903.30	128.7	2.51	3*n*	Doo

[Ho (2977, 3234)...]

1 7 **6035.** **Σ 1602.** Rectilinear motion; distance increasing 0″04 a year, with but little change in the angle.

1831.56	179°8	13″00	2*n*	Σ
1869.02	179.1	14.55	7*n*	Δ
1881.02	178.9	15.13	3*n*	Big
1890.53	178.9	15.63	2*n*	HΣ
1904.93	178.7	16.08	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XV**)... H (**V**)... Flm... Δ (1572)... Δ (**II**)... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13).... Seagrave (*Sid. Mess.* **II**, 22).... Cin^5 (called Σ 1599)...Big...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...β^6...]

6036. **H 2596.** (= **H 1207.**) "Beautiful double star; points back to a neb." The measures show no motion. $1^m\ 15^s$

1879.24	239°6	34″16	1*n*	β^3	8.0...10.5
1902.19	239.1	34.19	2*n*	β^6	8.0...10.7

6037. **H 199.** H (V) 78°5 : 5″±: 10...13–14 (1830+). Examined with the 6-inch (1876) and distance more than 10″. Large star 9 m in DM. 1 28

1904.07	76°8	17″40	2*n*	β^6	8.6...11.7

6039. **A. Clark 6.** Discovered by Alvan Clark, May 19, 1852, and given in a list of his stars by Dawes (*Mon. Not.* XVII, 257). Dawes has no observation of it. There is certainly an error of some kind in this place. From a careful examination on several occasions, I am sure there is no double star in this immediate vicinity, and there is no star brighter than 9½ or 10 m in this place. I applied to Mr. Clark in his lifetime, but he was unable to give any further information. The absence of any description makes it unlikely that it will ever be identified with certainty. 2 ±

6040. **Σ 1603.** (= **H IV. 108.**) The components have a large common proper motion. This is given from meridian observations: 2 8

A = 0″190 in 259°7 *A. G. Hels.*
0.186 in 260.7 Bossert
B = 0.220 in 258.0 *A. G. Hels.*
0.222 in 257.0 Bossert

As there has been no relative change, both stars must have the same motion. I have collected all the measures to 1892 (*Astronomy and Astrophysics* XI, 549). Some of the positions are:

1866.39	81°6	22″24	3*n*	Δ
1876.84	81.4	22.24	3*n*	OΣ
1883.20	82.0	22.33	5*n*	En
1892.37	81.7	22.30	4*n*	β

[Ma (*F. S.* **I**)... H^1... H (**V**)... Da^3... Ra (**XXIII**)... Δ (1206)... Δ (**I, II**)... OΣ (**IX, X**)...En (2662)...Hl (**I**)...Glasenapp (**II, IV**)...Big...β (*Ast. and A.-P.* **XI**, 549)...β (3142)(*Pub. L. O.* **II**)...Engelhardt (**III**)...*Annals Toulouse Obsy.* **III**...]

6041. **β 412.** Discovered with the 6-inch. No change is shown. 2 10

1879.26	167°1	2″59	1*n*	Cin
1886.30	160.2	1.77	1*n*	LM
1894.18	162.9	2.10	1*n*	Wilson
1903.23	159.7	2.05	3*n*	Doo

[β (**VII**)...β (2103)...Δ (**I**)...Cin^4...Cin^5...LM...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

6045. **Σ 3078.** Fixed. 3 10

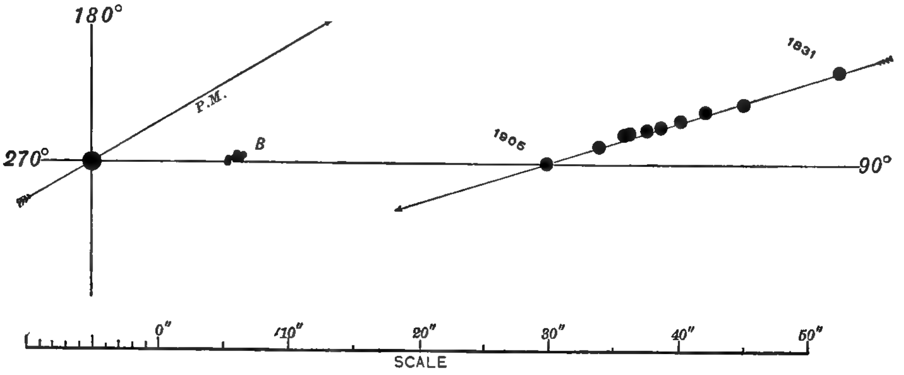
1868.46	305°9	9″55	4*n*	Δ

[Ma (*F. S.* **I**)...Δ (**II**)...]

$3^m\,15^s$ **6046.** **Σ 1604.** The proper motion of A, from meridian observations is given:

Porter	0".348 in 120°.4
Rad^8.	0.327 in 121.3

The nearest companion is moving with it, while the other is fixed in space. The measures of AC by Σ and β, 1831–1905, give for the proper motion of A, 0".321 in 107°.4. The minimum distance of these stars will be about 10".



Σ 1604

A and B

1831.95	93°.3	11".98	3*n*	Σ
1856.40	92.8	11.75	1*n*	Se
1863.31	94.6	11.38	1*n*	Hl
1865.63	92.5	11.21	7*n*	Δ
1869.85	91.6	11.37	2*n*	Du
1879.33	91.1	11.32	1*n*	β
1883.15	91.8	11.13	6*n*	En
1890.35	90.3	10.37	2*n*	Gla
1892.37	91.5	10.70	3*n*	β
1905.29	90.7	10.61	2*n*	β

A and C

1831.95	96°.9	58".00	3*n*	Σ
1856.40	95.2	50.38	1*n*	Se
1864.70	94.8	47.68	6*n*	Δ
1871.17	94.1	45.64	1*n*	Δ
1877.37	93.5	43.95	2*n*	Sp
1879.33	93.3	42.92	1*n*	β
1883.37	93.1	41.69	1*n*	Sp
1884.37	93.0	41.53	5*n*	Sp
1885.40	93.0	41.27	1*n*	Sp
1892.37	91.9	39.16	3*n*	β
1905.29	89.9	35.13	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**VII, VIII**) ... Se ... Flm ... Du ... Δ (1475) ... Δ (**II**) ... Hl (*Wash. Obsns.* 1863) ... Hl (**I**, p. 132) ... Sp (**II**) ... Pt ... Sk^3 ... Cin^5 ... Wilson (Cin^{10}) ... Big ... En (2663) ... β^3 ... β (3142) (*Ast. and A.-P.* **XI**, 870) (*Pub. L. O.* **II**) ... Glasenapp (**II**) ... Engelhardt (**III**) ... *Annals Toulouse Obsy.* **III** ... Do (3799) ... β^6 ...]

4 11 **6049.** **H 1213.** More nearly 10 m (1877).

4 19 **6050.** **Σ 1605.** (= **S 635** = **H 200.**) Fixed.

1867.82	278°.5	23".13	4*n*	Δ
1904.37	278.2	23.70	1*n*	Hu

[Ma (*F. S.* **II**) ... Δ (**II**) ... Cin^5 ... Cin^6 ...]

6051. **Espin 73.** Discovered by Espin (3784) (*Mon. Not.* LXII, 532). $4^m\,21^s$

6052. **Σ 3079.** (= **H 201.**) Fixed. 4 32

1868.24	88°.5	14".85	3*n*	Δ

[H (**V**) ... Ma (*F. S.* **I**) ... Δ (**II**) ... Cin^5 ...]

6053. **Σ 1606.** Slow motion in angle, and probably binary. 4 44

1831.48	348°.6	1".39	3*n*	Σ
1847.91	348.2	1.26	4*n*	OΣ
1866.73	343.0	1.20	3*n*	Δ
1879.33	340.3	1.20	2*n*	Hl
1880.48	337.2	1.17	3*n*	Je
1885.37	336.9	1.11	4*n*	Hl
1893.06	335.7	1.07	3*n*	Lewis
1897.41	335.1	1.07	3*n*	Brown
1898.17	332.9	1.04	2*n*	Hu
1903.39	331.7	1.02	2*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... H^1 ... H^2 ... Se ... Δ (1119) ... Δ (**I, II**) ... Du ... Do (2303, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13 ... Pt ... Ferr ... OΣ (**IX**) ... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... Je (2449) ... Flm ... Sk^3 ... Per ... Per (2684, 2748) ... Sp (**II**) ... T (2898) ... Big ... Glasenapp (**II**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403) ... Maw (**II, III, IV**) ... Big (*Bul. Ast.* **XII**, 299) ... Collins (*A. J.* 378) ... Brown (3645) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Coleman (*Mem. R. A. S.* **LIV**) ... Biesbroeck ...]

6056. **A 142.** No other measures. 5 9

[A (3741) (*Bul. L. O.* No. 3) ...]

6058. **S 634.** (= **σ 402.**) H (VIII) gives magnitudes, 6 ... 8. In O. Arg. S. 7 m. 5 14

1877.24	279°.9	6".82	1*n*	Cin	7.0 ... 8.2
1903.35	285.1	6.07	2*n*	Scott	6.5 ... 9
1905.09	284.3	6.65	3*n*	Doo	

[H (**VIII**) ... Cin^4 ... Cin^5 ... Scott (*Mon. Not.* **LXIV**, 52) ...]

6060. **Σ 3080.** No change. 5 24

1866.98	201°.5	4".72	3*n*	Δ
1904.36	200.4	4.82	1*n*	Hu

[Ma (*F. S.* **II**) ... Δ (**II**) ... Cin^6 ...]

$5^m\ 26^s$ **6062.** Σ 1610 *rej.* From *Catalogus Novus.* Examined and estimated, 320° : 20″ (1876). (See p. 1074)

5 30 **6063.** Σ 1607. (= **H 202** = **H 516.**) The motion is obviously rectilinear.

1830.99	350°.3	33″.07	3*n*	Σ
1845.88	352.4	32.42	2*n*	OΣ
1865.05	355.4	31.25	6*n*	Δ
1879.32	358.2	30.68	2*n*	β
1885.34	359.2	30.34	2*n*	Per
1897.42	1.3	29.98	5*n*	Doo
1904.63	2.6	29.17	3*n*	β

The faint star is not in Σ. The only other measures are:

1879.32	310°.0	20″.78	2*n*	β	8.5...12.5
1897.42	308.3	21.36	5*n*	Doo	
1904.08	310.6	21.03	1*n*	β	

[Ma (*F. S.* **I**)....Ma (**XIII**)....H^1....H^2....Ra (**XXIV**)....Flm....OΣ (**IX**).... Δ (1474)... Δ (**II**)...Gl...WS^2...Sk^2...β^1...Per...Per (2748)...Big... Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Sk^5...Glasenapp (**V**)...Do (3930)...β^6...]

5 31 **6064.** Σ 1608. (= **Sh 135.**) Distance may be increasing. The proper motion is 0″.17 in 180° (Bossert).

1869.17	223°.0	11″.36	5*n*	Δ
1881.01	223.0	11.66	3*n*	Big
1901.35	223.0	11.91	2*n*	Espin

[H^1...H^2...Ra (**XXIV**)...*Gr. Obsns.* 1840...Flm...Ma (*F. S.* **I**)...Δ (1185, 2194)...Δ (**I, II**)...Pt...Big...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 529)...]

5 31 **6065.** **H 4505.** "Fine double star."

1882.28	270°.7	12″ ±	1*n*	Wilson	8...11
1900.41	269.2	9.86	2*n*	Innes	
1905.15	271.1	9.94	3*n*	Doo	

[Wilson (Cin^{10})....Innes (*Mon. Not.* **LXI**, 592) (*Annals Obsy. Cape Good Hope* **II**, Part 4)...]

5 32 **6066.** **H 4506.** "An elegant object." Examined, and angle seemed less (1876). The later measures appear to show retrograde motion.

1882.28	355°.2	3″.5 ±	1*n*	W	8 ...10
1900.30	340.2	4.27	2*n*	Hu	8.5... 9
1903.72	338.3	4.45	2*n*	β	8.5... 9.5
1905.22	337.2	4.32	5*n*	Doo	

[Wilson (Cin^{10})...Hu (*Bul. L. O.* No. 44)...β^6...]

5 36 **6067.** **Sh 136.** (= σ 404 = OΣ (App) 117.) The principal star is given a proper motion of 0″.048 in 308°.5 (Bossert).

1876.36	75°.6	65″.08	3*n*	Δ	6.0...8.0
1882.73	75.6	65.36	4*n*	Fr	

[Δ (**I**)....Franz (2649)...]

6068. Σ 1609. The large star has a proper motion of 0″.140 in 270°.0 (*A. G. Harvard*). No relative change. $5^m\ 41^s$

1868.78	205°.9	10″.83	4*n*	Δ
1903.05	205.7	10.97	2*n*	β

[H (**V**)...Ma (*F. S.* **I**)...Δ (**I**)...β^6...]

6070. **H. C. Wilson 10.** From Cin^{10}; rough place. Recently examined, and found to be about 3′ *sf* the 9.1 m star, Cord. DM (22°) 9301, the place of which is: 6

R. A. = $12^h\ 3^m\ 49^s$
Decl. = −22° 49′.5

The only measure is:

1904.34	34°.1	10″.55	1*n*	β^6	10.5...10.7

6072. Σ 1611. Fixed. 6 6

1867.91	4°.4	1″.48	3*n*	Δ
1879.32	5.7	1.26	1*n*	Cin

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...]

6073. **H 2602.** The only observation since Herschel is: 6 20

1880.33	224°.1	23″.84	1*n*	Big	9.5...10

6074. OΣ (App) 118. Not found by Δ (I, p. 234) and Franz (2649). Undoubtedly it is identical with No. 6067. 6 24

6075. Σ 1612. No motion. 6 28

1869.00	9°.0	5″.52	4*n*	Δ
1905.05	9.5	5.63	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...β^6...]

6076. Σ 1613. Fixed. 6 30

1867.90	16°.8	1″.44	3*n*	Δ
1899.36	12.3	1.40	2*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**II**)...Per...Per (2684)...Lewis and Bowyer (*Mon. Not.* **LX**, 503)...]

6077. Σ 1614. Unchanged. 7 17

1869.28	191°.5	18″.43	4*n*	Δ
1879.32	190.8	18.92	1*n*	Cin

[Ma (*F. S.* **I**)....Δ (**II**)....Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13).... Cin^5...]

6078. **Hu 735.** No other measures. 7 33

[Hu (*Bul. L. O.* No. 65)...]

6080. **Hu 570.** A later measure is: 7 42

1903.39	108°.4	2″.04	1*n*	Lewis

[Hu (*Bul. L. O.* No. 27)...Lewis (*Mon. Not.* **LXIV**, 797)...]

7^m 57^s **6081.** **H** 2603. Nothing since Herschel but the following:

1904.06	16°.9	24″.00	2*n*	β^6	8.1...12.5

8 4 **6082.** **Σ** 1615. Unchanged.

1866.73	88°.1	26″.75	3*n*	Δ
1898.34	87.6	26.82	2*n*	Gla

[H^1...H^2...**H** (**V**)...Ma (*F. S.* **II**)...Ma (**XIII**)...Ra (**XXIV**)...Δ (1206)...Δ (**I, II**)...Coleman (*Mem. R. A. S.* **LIII**)...Glasenapp (**V**)...]

8 6 **6083.** **H** 203. The principal star is *Virginis* 78. It has a proper motion of 0″.184 in 319°.5 (Bossert), which corresponds very closely with the change shown by the measures.

1878.24	351°.6	30″.20	1*n*	β^1	
1901.24	351.3	26.19	3*n*	β^5	6.8...12.7

8 19 **6084.** **Σ** 1616. (= **H** IV. 114.) There is no change in the Struve companion. The large star is given a proper motion of 0″.17 in 180° (Bossert).

1869.43	296°.3	23″.08	4*n*	Δ
1905.05	295.6	23.31	2*n*	β

There is a distant 9.5 m star, not in Struve, of which these are all the measures:

1864.33	291°.5	149″.47	1*n*	Δ
1905.05	292.7	154.43	2*n*	β

The apparent change in distance indicates proper motion in R. A. rather than Decl.

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...*A. G. Leipzig*, p. 248...β^6...]

8 44 **6086.** **Innes** 81. Discovered by Innes at the Cape of Good Hope.

[Innes (3406) (*Mon. Not.* **LVII**, 533; **LXII**, 476; **LXIII**, 76) (*Annals Obsy. Cape Good Hope* **II**, Part 4)...]

8 51 **6087.** **H** 204. H (IV), *yellow: blue;* 8...12.

1904.05	55°.8	35″.78	2*n*	β^6	7.7...10.9

8 56 **6088.** **Σ** 1618. (= **S** 636.) No material change.

1868.71	65°.2	25″.70	4*n*	Δ
1894.34	64.7	26.35	2*n*	Leip

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...*A. G. Leipzig*, p. 209...*Annals Toulouse Obsy.* **III**...]

8 56 **6089.** **Σ** 1617 *rej.* Measured since Part I was in type:

1905.05	261°.6	31″.34	2*n*	β^6	8.0...9.6

6090. **Σ** 1619. (= **Sh** 137.) Perhaps a little change in angle. The proper motion of each star is, 0″.317 in 260°.9 (Bossert). 8^m 59^s

1867.57	284°.3	7″.41	4*n*	Δ
1903.22	279.9	7.39	5*n*	Jouffray
1904.38	279.4	7.49	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VII, VIII**)...Ra (**XXIII**)...Se...Δ (1185)...Δ (**I, II**)...Glasenapp (**I**)...Cin^5...Maw (**III**)...*Annals Toulouse Obsy.* **III**...Jouffray (*Bul. Ast.* **XXI**, 299)...]

6092. **H** 3337. "No description." Examined and found to be a pair of small stars in the field *p* 6 *Comae;* estimated, 150°: 10″: 11...13 (1876). 9 27

6094. *Corvi* 17. **β** 920. Discovered with the 18½-inch. My single observation in 1879 is noted, "Very poor measure." and the apparent motion in angle may not be real. The magnitude in Gould is 6.7. Lalande 22971. 9 34

1880.36	232°.4	0″.92	1*n*	Pt
1892.25	252.4	0.79	3*n*	β
1892.34	250.5	0.81	4*n*	Lv
1897.79	252.5	0.97	6*n*	A
1903.23	253.6	1.16	3*n*	Doo
1905.28	257.1	1.17	4*n*	Doo

[β (**XIII**)...β^3...β (3142) (*Pub. L. O.* **II**)...Pt...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)....A (3395, 3465, 3585)....Doolittle (*Pub. Flower Obsy.* **II**)...]

6095. **Σ** 1620. Fixed. 9 41

1867.83	80°.1	2″.05	4*n*	Δ
1892.33	81.5	1.93	1*n*	Lv

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

6096. **A** 143. (AC = **H** 846.) H only estimated C, 115°: 7″. No other measures. 9 44

[A (3741) (*Bul. L. O.* No. 3)...]

6097. **Σ** 1621. Some change in both angle and distance, but the character of the motion is uncertain. 9 54

1830.32	124°.0	3″.44	4*n*	Σ
1867.91	131.7	3.13	3*n*	Δ
1884.10	131.6	2.99	5*n*	En
1887.36	134.3	2.55	3*n*	Hl
1896.45	136.2	2.54	3*n*	A
1903.32	138.7	2.23	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^3...Flm...Δ (**II**)...Gl...Pt...Hl (**II**)...En (2742)...A (3395)...Brown (3645)...Bowyer and Lewis (*Mon. Not.* **LIX**, 400; **LXIV**, 797)...Do (3930)...]

6098. **A** 144. No other measures. 9 55

[A (3741) (*Bul. L. O.* No. 3)...]

10m 3s **6099.** **Hu 736.** Measured since Part I was in type:

1904.75	80°.8	0″.31	3*n*	Hu	8.8...8.8

[Hu (*Bul. L. O.* No. 65)...]

10 4 **6101.** **Σ 1623** *rej.* From *Catalogus Novus.* The only measure is:

1905.05	181°.1	45″.67	1*n*	β^6	8.0...9.0

10 7 **6102.** 2 *Canum Ven.* **Σ 1622.** (= **H III. 85 = Sh 138.**) Without change. Common proper motion of 0″.036 in 156°.1 (Auwers).

1866.76	259°.3	11″.47	3*n*	Δ
1898.45	258.7	11.61	6*n*	Coleman

[Ma (*F. S.* **I**)....Ma (**XI, XII, XIII**)....H^1....H (**V**)....Se....Ra (**XXIII**).... Δ (1206)...Δ (**I, II**)...WS...Gl...OΣ (**IX**)...Sp (**II**)...Per...Per (2748)... En (2663)...Glasenapp (**IV**)...Coleman (*Mem. R. A. S.* **LIV**)...Giacomelli (**II**)...]

10 42 **6105.** **Σ 1624.** Fixed.

1866.87	152°.3	6″.02	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Cin^5 (called Σ 1626)...Δ (**II**)...]

10 43 **6106.** **A. G. 176.** Double in *A. G. Leiden.* Measures by Aitken.

1904.26	181°.3	2″.69	1*n*	β^6	9.2...9.2

11 0 **6107.** **Σ 1625.** (= **Sh 139.**) Fixed. A small common proper motion, 0″.038 in 90° (Bossert.)

1867.52	218°.7	14″.29	4*n*	Δ

[Σ^1...OΣ (**IX**)...*Gr. Obsns.* 1840...Ra (**XXIII**)...Ma (*F. S.* **I**)...Δ (1206)... Δ (**I, II**)...Gl...Big...*Annals Toulouse Obsy.* **III**...]

11 5 **6108.** **Σ 1626.** No material change.

1870.10	5°.9	2″.14	4*n*	Δ

[Ma (*F. S.* **I**)...H (**V**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (3023) ...Δ (**II**)...]

11 19 **6109.** **β 796.** Discovered with the 15½-inch at the Washburn Observatory. There is apparently no change unless it is in distance. There seems to be some error, in printing or otherwise, in the angle of Engelmann. There is no other known close pair in this vicinity. The following are all the later measures.

1883.83	78°.3	0″.27	6*n*	En
1886.34	266.9	0.35	2*n*	HΣ
1888.69	272.7	0.59	2*n*	Com
1896.52	260.0	0.66	3*n*	A
1898.41	273.0	0.52	3*n*	A
1903.61	264.8	0.51	5*n*	Doo

[β (**XII**)...β^4...En (2678)...Com (*Pub. Washburn Obsy.* **VI**)...HΣ (**XII**)... A (3395, 3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6111. **OΣ 245.** Fixed. Heis gives this as a naked-eye star. 11m 28s

1867.21	277°.0	8″.25	3*n*	Δ
1898.34	278.6	8.50	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...β^1...β^3...Per...Per (2685)...Glasenapp (**V**) ...Hu (*Pub. L. O.* **V**)...]

6112. **β 921.** Discovered with the 18½-inch. Lalande 23027. The later measures are: 11 42

1892.25	217°.3	3″.20	3*n*	β	7.6...10.3
1892.31	218.5	2.95	4*n*	Lv	7.0...12.0
1899.16	215.7	3.39	3*n*	β	7.2... 9.7

[β (**XIII**)...β^3...β^4...β (3142)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

6113. **Σ 1627.** (= **H N. 22 = Sh 140.**) The proper motion, according to Battermann, is: 12 0

A = 0″.062 in 301°.5
B = 0.054 in 309.9

No relative motion.

1867.76	196°.8	20″.09	4*n*	Δ
1895.20	196.5	19.94	3*n*	Giacomelli
1904.37	196.1	20.17	1*n*	Hu

[Ma (*F. S.* **I**)...H (**IV, V**)...Se^1...Ra (**XXI**)...En...Δ (1206)...Δ (**I, II**)... Je (2351)...Cin^5...Wilson (Cin^{10})...Glasenapp (**I, III**)...T (3185)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...Giacomelli (**II**)...]

6114. **OΣ 246** *rej.* From *Poulkowa Catalogue* of 1850. Subsequently rejected by OΣ as single. Single, Δ 1866, β 1878, and Hu 1898, and probably not a close pair. The large star has a proper motion of 0″.173 in 280°.6 (Schroeter). 12 23

[OΣ (**IX**)...Δ (**I**, p. 228)...β^1...Hu (*Pub. L. O.* **V**)...]

6115. **Σ 1628.** (= **H 205 = H 1216.**) Fixed. (See No. 6116.) 12 36

1866.89	239°.9	9″.48	3*n*	Δ
1905.09	240.9	9.56	2*n*	β

The only measure of the distant star noted by Herschel is:

1905.05	349°.8	47″.46	1*n*	β	...11.0

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Se...Δ (**II**)...Glasenapp (**V**)...β^6...]

6116. **H 1216.** "A 10 m star 20″ *n* of A." Suspecting this might be the same as Σ 1628, I examined the place, and found that to be the case. Σ 1628 has a faint star in the place indicated. There is an error of 30′ in Herschel's Decl. 12 36

6120. **Σ 1629** *rej.* From *Catalogus Novus.* Examined and estimated, 300° : 20″ : 9...10 (1877). (See p. 1074) 13 0

6121. **Σ 1630.** No material change. 13 3

1867.92	169°.0	2″.38	3*n*	Δ
1901.82	168.3	2.73	2*n*	Espin

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...β^1...Cin^5... Espin (*Mon. Not.* **LXII**, 529)...]

$13^m\ 10^s$ **6123.** **A 145.** No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

13 18 **6124.** **H 2609.** "A neat double star, *sf* a bright neb."

1904.28	106°3	12″85	2*n*	β^6	10.0...10.3

13 58 **6127.** **β 605.** (= **Hd 131.**) Discovered with the 18½-inch. The measures are not accordant, but there is probably no sensible change. The magnitude in Gould is 6.4, and 6½ in B. A. C. It is near *ζ Corvi.* Lalande 23119. This star has a proper motion of 0″108 in 259°3 (Auwers). This is nearly the same as that of *ζ Corvi.*

1878.43	136°3	1″01	2*n*	Cin
1882.40	141.7	0.53	2*n*	Sp
1889.04	137.0	0.8±	1*n*	Lv
1891.32	143.8	1.03	3*n*	β
1903.97	145.5	1.01	3*n*	Doo

[β (**X**)...β^1...β (3114) (*Pub. L.O.* **II**)...Cin^5...Sp (**II, III**)...Wilson (Cin^{10})...Lv^1...Doolittle (*Pub. Flower Obsy.* **II**)...]

13 59 **6129.** **β 27.** Discovered with the 6-inch. Evidently without change.

1882.45	109°3	3″27	3*n*	Ho
1886.30	106.8	3.58	3*n*	HΣ
1898.32	105.0	3.41	3*n*	A

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...WS^2...Pt...Δ (**I**)...OΣ (**X**)...Ho (2978)...Doolittle (*Pub. Flower Obsy.* **I**)...A (3585)...HΣ (**XII**)...]

14 15 **6130.** **Σ 1632.** (= **♅ N. 52.**) No motion.

1866.20	193°3	10″27	3*n*	Δ
1905.05	192.0	10.15	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β^1...β^6...]

14 21 **6131.** *ζ Corvi.* **β 1245.** The very minute companion was discovered with the 36-inch. The proper motion of the bright star is 0″130 in the direction of 254°4 (Auwers). It is probably only an optical pair, as the change in the position of the companion shown by the two sets of measures agrees very closely with the proper motion of A. The minimum distance of the companion was 2″6 about 1860. The Harvard observers suspected an elongation of the large star in 1870 (Hd 132), but this has never been seen since.

1891.31	42°3	4″81	3*n*	β	5.5...13.8
1899.16	48.7	5.76	2*n*	A	5.0...14.0

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...A (3639)...]

14 39 **6133.** 11 *Comae.* **Ho 52.** The principal star has a proper motion of:

Auwers	0″166	in	302°8
Bossert	0.145	in	308.3

This appears to belong also to the companion.

1892.36	42°9	8″77	2*n*	Ho
1894.36	43.7	8.95	2*n*	Ho
1901.28	43.6	9.15	3*n*	β
1903.82	42.1	9.22	2*n*	Doo

[Ho (2778, 3234, 3558)...Lewis (*Mon. Not.* **LX**, 503; **LXIV**, 797)...β^5...]

6134. **Σ 1633.** (= **♅ N. 31 = Sh 141.**) Fixed. $14^m\ 39^s$

1866.28	245°3	8″76	3*n*	Δ
1890.22	244.7	8.72	6*n*	Giacomelli

[Ma (*F. S.* **I**)....Ma (**XI**)....H^2...Wr....Ba (**II**)....Ra (**XXIV**)....OΣ (**IX**)....Δ (1206)...Δ (**I, II**)...Sp (**II**)...Per...Per (2748)...Glasenapp (**II, III**)...Gl...Pt...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

6135. **Σ 1634.** Fixed. 14 40

1868.80	149°1	5″15	4*n*	Δ
1905.05	147.5	5.34	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VI**)....Se...Se^3...Δ (**II**)...β^6...]

6136. **Ho 536.** No motion. 14 42

1903.31	97°0	3″48	3*n*	Doo

[Ho (3757)...]

6137. **H 517.** H (VI) 256°0 : 15″± : 8...13 (1831+). 14 42

(See p. 1074)

6138. **Σ 1635.** Fixed. 14 57

1866.96	173°3	13″31	3*n*	Δ
1882.27	174.0	13.41	2*n*	Wilson

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**VII, VIII**)....Δ (**II**)....Pt....Cin^5....Cin^6....Wilson (Cin^{10})...]

6139. **Howe 26.** (= **Hd 133.**) Discovered at the Cincinnati Observatory. 15 19

1879.27	150°2	5″42	1*n*	Cin

[Cin^4...Cin^5...Hd...]

6141. **Hu 737.** The mean of all the measures is: 15 24

1903.30	47°6	2″68	3*n*	Hu	9.0...10.0

[Hu (*Bul. L. O.* No. 65)...]

6142. **Hn 12.** The later measures are: 15 43

1888.80	94°2	1″13	2*n*	Com

[β^4...Com (**VI**)...]

6145. **OΣ 247** *rej.* From *Poulkowa Catalogue* of 1843; excluded in 1850 as single. Ma found or suspected an elongation of 0″25± in 26°2 (1848.4). All other observers have seen it single, Δ in 1866, β with 18½-inch in 1878, and with the 36-inch in 1891, and Hu with the 36-inch in 1899–1900. It is probably not double. 16 11

Hussey has detected a 13.5 m companion, not previously seen.

1899.50	334°6	12″62	3*n*	Hu

[Ma (**XIII**)...Δ (**I**, p. 228)...β^1...β (3114) (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...]

$16^m\ 26^s$ **6146.** **Wn 4.** A wide pair measured by Winnecke. Both stars in *A. G. Hels.*

1902.99	84°6	49″58	2*n*	β	8.9...9.0

[Wn (1738)...β^6...] (See p. 1074)

16 26 **6147.** 17 *Virginis.* **Σ 1636.** (= **H IV. 50** = **Sh 142.**) There is probably no change in the components, although later observers make the distance greater than Struve. The stars have a common proper motion:

Auwers	0″195 in 254°0
Bossert	0.189 in 251.4
Glasgow	0.203 in 233.3

1859.93	336°7	19″85	3*n*	OΣ
1866.53	335.9	19.64	3*n*	Δ
1878.71	336.6	19.87	5*n*	Je
1880.36	336.6	20.12	4*n*	Sp
1890.24	336.1	19.90	4*n*	Giacomelli

[Ma (*F. S.* **I**, 29, 139)....Ma (**XIII**)....Ra (**XXI**)....Δ (1119)....Δ (**I, II**)....OΣ (**IX**)...WS...Gl...H (**V**)...Hl (*Wash. Obsns.* 1863)...Hl (**I**)...Je (2351)....Sp (**II**)....Per....Per (2748)....Glasenapp (**II**)....Engelhardt (**III**)....*A. G. Leipzig*, p. 248...Giacomelli (**II**)...]

16 28 **6148.** 12 *Comae.* **Sh 143.** (= **H V. 12** = σ 412.) Without change. The principal star is given a proper motion of 0″024 in 284°7 (Auwers). The companion is DM (26°) 2338.

1840.30	167°4	65″16	2*n*	OΣ	5.0...8.5
1879.20	167.1	65.13	2*n*	Doubiago	
1904.06	167.2	65.22	2*n*	β	

There is a 12.5m star nearer A, not previously observed:

1904.06	54°1	35″00	2*n*	β

[OΣ (X)...β^6...]

17 12 **6149.** **H 4517.** These are all the measures:

1879.36	184°7	14″37	1*n*	Cin	9.0...10.5
1882.27	185.3	15.25	2*n*	W	8.5... 9.2
1904.34	185.9	14.20	1*n*	β	9.5... 9.8

[Cin^5...Wilson (Cin^{10})...β^6...

17 29 **6151.** **Ho 53.** The later measures are:

1895.38	295°4	2″05	2*n*	Ho
1902.35	297.9	2.25	4*n*	Doo

[Ho (2778, 3558)...]

17 31 **6152.** **See 150.** Later measures are:

1899.54	98°5	17″88	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

17 33 **6153.** **Σ 1637** *rej.* Measures by β^6. The larger star has a proper motion of 0″055 in 280°3 (*A. G. Berlin*).

$17^m\ 46^s$ **6154.** **H 209.** The only measure is the following:

1880.22	146°1	25″55	1*n*	Big	9.5...10

18 2 **6155.** **OΣ 249.** The change in AB is very slow, the distance remaining practically constant. The system has a proper motion of 0″083 in 90° (*A. G. Harvard*).

1843.32	330°5	0″40	2*n*	Ma
1871.02	308.9	0.52±	5*n*	Δ
1878.79	308.9	0.49	2*n*	β
1879.42	310.8	0.43	2*n*	Hl
1882.95	306.4	0.45	6*n*	En
1898.33	299.2	0.54	3*n*	Hu

The following are all the later measures of the distant star:

AB and C

1878.79	149°1	12″96	2*n*	β
1879.42	149.1	13.37	2*n*	Hl
1881.31	150.1	13.11	1*n*	Big
1883.37	151.0	13.41	2*n*	En
1898.46	148.4	13.29	2*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Flm...Δ (**I**)...Hl (**I**)...En (2678)...β^1...β^3...Big...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

18 4 **6156.** **OΣ 248** *rej.* From *Poulkowa Catalogue* of 1843; rejected as single in the edition of 1850. Retained here from Ma (XI) 28°0:0″25± (1843.25) 1*n*, and three other measures 1846–51. This was probably an error, as all observers have found it single since; Δ in 1866, Hl with 26-inch in 1875, β with 18½-inch in 1878, and 36-inch in 1891, and Hu with the 36-inch in 1899. This star has a proper motion of 0″085 in 200°4 (Bossert).

[Ma (**XI, XIII**)....Δ (**I**, p. 228)....β^1....β (3114)(*Pub. L. O.* **II**)....Hu (*Pub. L. O.* **V**)...]

18 18 **6157.** **Σ 1638** *rej.* In the field *sp* OΣ 250. The only measure is:

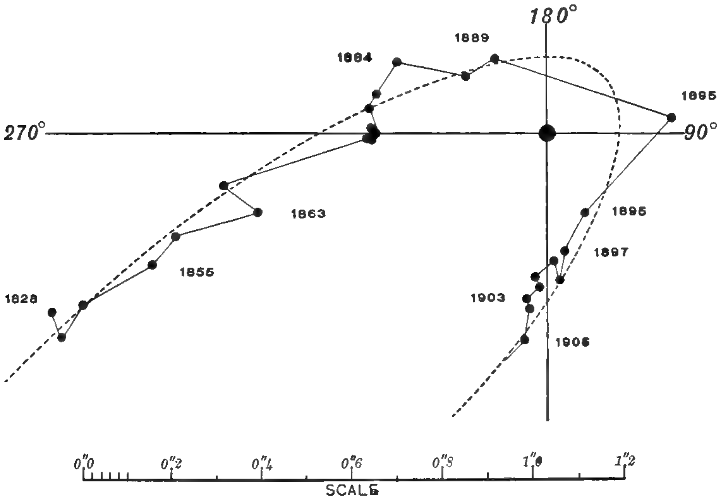
1905.07	283°6	8″39	1*n*	β^6	9.6...10.0

18 25 **6158.** **Σ 1639.** Binary of long period. The companion has passed over about 300° of position-angle, but the period is still uncertain. The unexpired portion of the apparent orbit in the fourth quadrant cannot be positively known for many years. The ellipse, a portion of which is shown on the diagram, is given merely as an illustration of one of the many ellipses, varying greatly in area, which will equally well represent the observed positions. This orbit would make the period more than 400 years.

1828.86	290°0	1″18	4*n*	Σ
1836.49	292.8	1.18	2*n*	Σ
1842.62	290.4	1.11	4*n*	OΣ
1855.32	288.0	0.93	1*n*	OΣ
1856.90	285.8	0.86	2*n*	Se
1863.16	285.7	0.67	4*n*	Δ
1870.31	279.8	0.73	1*n*	OΣ

1875.39	273°.1	0″.40	4*n*	Sp
1875.78	273.3	0.39	2*n*	Δ
1877.38	269.1	0.39	4*n*	Sp
1877.87	271.0	0.38	2*n*	Δ
1880.35	262.8	0.40	4*n*	Sp
1882.39	258.1	0.39	4*n*	Sp
1884.17	245.2	0.37	5*n*	Sp
1887.39	235.9	0.22	8*n*	Sp
1889.40	215.6	0.2±	1*n*	HΣ
1892.36	Single, 36-in.			β
1895.23	97.1	0.28	1*n*	Lewis
1895.32	25.4	0.2±	3*n*	HΣ
1897.16	8.6	0.27	3*n*	A
1898.31	4.7	0.33	3*n*	A
1899.40	3.3	0.29	3*n*	A
1901.26	355.7	0.33	3*n*	A
1903.34	357.3	0.35	3*n*	Lewis
1903.41	352.9	0.38	3*n*	A
1903.84	354.1	0.40	6*n*	Biesbroeck
1905.15	353.8	0.47	2*n*	A

Lewis, from the measures to 1901, finds a provisional period of 180 years.



Σ 1639

[Ma (*F. S.* I) ... Ma (**XI, XIII**) ... H^{2} ... OΣ (**IX**) ... Δ (1185, 2193) ... Δ (**I, II**) ... Se ... Do (2307) ... Flm ... Sp (2133) ... Sp (**II**) ... Sp (**II**, App.) ... Sk^{3} .... En (2663, 2786) ... T (2898) ... Big ... β (3142) (*Pub. L. O.* **II**) ... Glasenapp (**II**) ... Brown (3645) ... HΣ (**XII**) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) ... A (3465, 3585, 3639) ... A (*Bul. L. O.* No. 11) ... Lewis (*Mon. Not.* **LXII**, 209) orbit ... Biesbroeck ...]

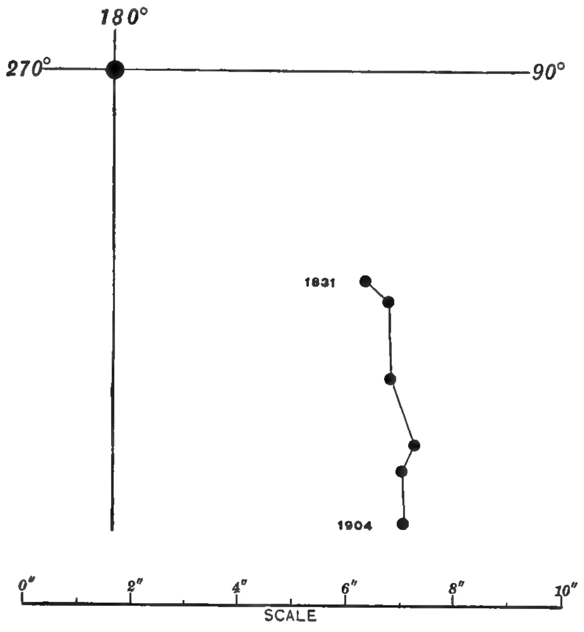
18^{m} 30^{s} **6159.** OΣ 250. Apparently unchanged.

1843.44	335°.7	0″.42	2*n*	Ma
1870.45	329.8	obl.	4*n*	Δ
1878.70	332.0	0.50	2*n*	β
1879.39	324.3	0.37±	2*n*	Sp
1893.37	331.4	0.42	5*n*	Lewis
1898.87	333.9	0.50	4*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Sp (**II**) ... β^{1} ... β^{3} ... Lewis (*Mon. Not.* **LIV**, 316) ... Hu (*Pub. L. O.* **V**) ...]

6160. A. G. 177. Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 18^{m} 35^{s}

6161. Σ 1641. H (V) speaks of a third star, 10–11 m *n*, measures of which are given below. The change in AB is due to proper motion. As there appears to be no sensible change in the distant star, the proper motion must be in B. 18 38



Σ 1641

1831.38	50°.4	6″.14	2*n*	Σ
1844.38	50.3	6.69	1*n*	Ma
1868.23	42.3	7.75	4*n*	Δ
1878.28	39.2	8.96	2*n*	β
1888.32	36.1	9.20	3*n*	Hl
1898.21	33.6	10.07	4*n*	Doo
1904.14	33.0	9.97	2*n*	β

A and DM (38°) 2329

1868.26	204°.9	76″.25	1*n*	Δ
1904.26	206.2	76.41	1*n*	β

[Ma (*F. S.* I) ... Ma (**XI**) ... H (**V**) ... Δ (1800) ... Δ (**II**) ... Flm ... Pt ... β^{1} ... Hl (**II**) .... Collins (*A. J.* 378) .... Doolittle (*Pub. Flower Obsy.* I) .... Brown (3645) ... β^{6} ...]

6162. Σ 1640 *rej.* From H (VI). "A large star *f* with two small companions." The only measures are: 18 44

1905.07 238°.1 31″.18 2*n* β^{6} 8.1 ... 10.3

The principal star is DM (64°) 893. The 6.3 m star 47^{s} *f* is a similar but wider pair:

1905.07 244°.9 52″.34 1*n* β^{6} 7 ... 10.7

6163. See 152. Later measures are: 19 6

1899.79 84°.8 2″.22 3*n* Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

19^m 22^s **6164.** **O. Stone 23.** A later measure is:

1880.33	330°.0	13″.46	1*n*	Cin

[Cin^5...Cin^6...]

19 48 **6165.** **β 606.** *Corvi* 35. Discovered with the 18½-inch. Lalande 23250. Probably no motion.

1889.04	93°.5	1″.20	3*n*	Sp
1891.26	99.1	1.25	3*n*	β
1892.40	99.8	1.21	1*n*	Sp
1898.92	96.8	1.40	3*n*	Doo
1902.42	94.9	1.34	3*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...Sp (**II, III**) ... Doolittle (*Pub. Flower Obsy.* **I, II**)...Brown (3645)...]

19 53 **6166.** **Σ 1642.** Fixed.

1866.33	182°.0	2″.57	3*n*	Δ
1897.53	180.0	2.36	2*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Du... Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIV**)...]

19 58 **6167.** **β 922.** Discovered with the 18½-inch. The change, if any, is small. These are all the later measures:

1889.99	167°.4	0″.6±	3*n*	Sp
1892.39	163.3	0.55	1*n*	Sp
1898.24	157.8	0.77	2*n*	Doo
1905.06	156.0	0.85	3*n*	Doo

[β (**XIII**)...β^3...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

20 17 **6168.** **Hn 13.** Probably fixed.

1888.38	152°.0	1″.50	3*n*	Com	8.7...9.3
1903.34	151.3	1.41	5*n*	Doo	

[β^4...Lv^1...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

20 37 **6170.** **A 78.** This star has a proper motion of 0″.036 in 236°.2 (Battermann). No other measures.

[A (3668)(*Bul. L. O.* No. 11)...]

20 37 **6171.** **A. G. Clark 4.** Discovered by Alvan G. Clark in 1876 with the 12-inch now at Vienna. Probably no motion. The following are all the other measures:

1877.73	235°.0	0″.95	3*n*	Δ	7.2...9.8
1885.38	229.7	0.88	3*n*	Hl	
1901.36	223.5	0.81	3*n*	A	

[β (*Am. Jour. Sci.* April 1879)....Hl (2147)(*Wash. Obsns.* 1885)....Hl (**II**)....Δ (**I**)...A (*Bul. L. O.* No. 11)...]

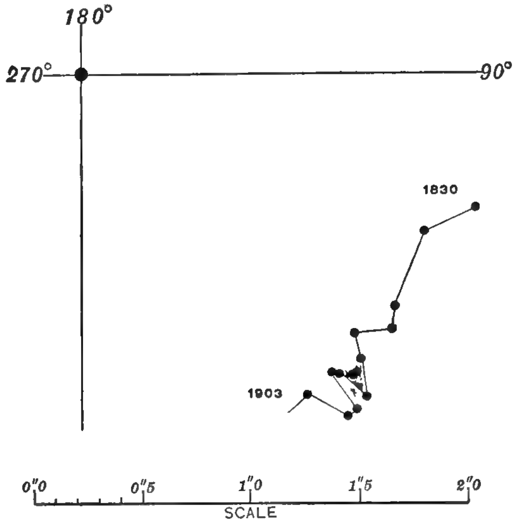
20 50 **6172.** **A 79.** (AC = **H 210.**) Close pair discovered by Aitken at Lick Observatory. The distant star was only estimated by H, 140°: 20″.

[A (3668)(*Bul. L. O.* No. 11)...]

6173. **S 637.** The magnitudes in O. Arg. S. are, 8...8–9. 20^m 59^s
The following are all the observations since 1825:

1881.39	202°.8	60″.64	3*n*	β^4	8.1...8.6
1904.43	202.9	60.42	2*n*	β^6	8.1...8.4

6174. **Σ 1643.** Slow retrograde motion. The distance appears to be unchanged, and the motion so far is practically rectilinear. 21 13



Σ 1643

1830.36	71°.2	1″.94	5*n*	Σ
1844.38	65.4	1.76	1*n*	Ma
1865.64	53.6	1.82	3*n*	Δ
1873.24	50.7	1.88	2*n*	Δ
1878.29	46.6	1.76	1*n*	β
1888.34	44.6	1.86	4*n*	Hl
1893.36	41.7	2.01	2*n*	Lewis
1894.26	40.9	1.85	4*n*	Com
1897.40	40.2	1.82	1*n*	Brown
1899.32	39.6	2.03	2*n*	Lewis
1900.30	38.1	2.02	3*n*	Bowyer
1903.42	35.4	1.83	1*n*	A

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**VI**)... Hd...Do (2303, 3023, 3930)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Flm... Pt...En (2663)...β^1... Sk^3... Hl (**II**) .... Big .... Greenwich Obsy. (*Mon. Not.* **LIV** 316; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797)...Δ (1572)...Δ (**II**)...Collins (*A. J.* 378) ....Com (*Pub. Washburn Obsy.* **X**) .... Doolittle (*Pub. Flower Obsy.* **I, II**)... Brown (3645)...HΣ (**XII**)...Biesbroeck...]

6175. **Σ 1644.** There may be a little change in the distance. A has a proper motion of 0″.012 in 284°.2 (Kustner). 21 18

1852.31	249°.3	21″.42	1*n*	OΣ
1867.89	247.0	21.08	3*n*	Δ
1870.31	247.0	20.88	1*n*	OΣ
1878.30	246.8	21.06	2*n*	β
1885.35	246.4	20.89	2*n*	Per
1888.42	246.1	20.88	2*n*	Hl
1903.23	245.9	20.55	2*n*	Do

[Ma (*F. S.* **II**)...H (**IV, V**)...OΣ (**IX**)...Flm ...Δ (1031, 2194)...Δ (**II**)...Sk^3 ...β^1...Pt...Per...Per (2748)...Hl (**II**)...Big...Do (3930)...]

$22^m\ 12^s$ **6177.** **β 923.** *Virginis* 168. Discovered with the 18½-inch. W¹ XII, 344. Probably unchanged.

1892.13	61°.8	2″.66	3*n*	β	6.8...11.7
1898.50	59.1	2.65	3*n*	A	7.0...12.2
1901.34	62.8	2.54	3*n*	Doo	

[β (**XIII**)...β^3...β (3142)(*Pub. L. O.* **II**)... A (3585)... Doolittle (*Pub. Flower Obsy.* **II**)...]

22 13 **6178.** **Σ 1646.** No sensible change.

1869.10	257°.2	5″.41	4*n*	Δ
1905.05	258.2	5.33	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...WS...Gl...Δ (**II**)...β^6...]

22 16 **6179.** **Σ 1645.** (= **Sh** 144.) Without change. In Ma (XV) called Σ 1654.

1867.90	160°.0	10″.15	4*n*	Δ
1897.53	160.5	10.42	3*n*	Coleman

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... H^1... H^2...Wr... Ra (**XXIV**)...H (**IV, V, VII**) ... Δ (1206) ... Δ (**I, II**) ... Collins (*A. J.* 378) ... Glasenapp (**IV**)... *Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

22 55 **6180.** 17 *Comae.* **β 1080.** (AB = **Σ** 21, **App. I** = **S** 638.) The close component was discovered with the 36-inch. The only later position is:

B and C

1898.48	156°.0	1″.83	1*n*	A

There is no change in the wide stars. According to Auwers, they have different proper motions:

A = 0″.015 in 258°.5
B = 0.018 in 235.9

As the measures show no change, they must have the the same proper motion.

A and B (= Σ 21, App. I)

1870.35	250°.6	145″.35	5*n*	Δ
1877.77	250.4	145.37	5*n*	Je
1889.11	250.3	145.05	2*n*	β
1899.29	250.4	145.27	1*n*	β

[β (**XV**) ... β (2929) (*Observatory* **XII**, 227) (*Pub. L. O.* **II**)... A (3585)...Se... Δ (**II**)...*Radcliffe Obsns.* 1868, 1880, 1881...Je (2338)...]

23 9 **6181.** **OΣ 251.** The duplicity of this star is very doubtful to say the least. It has not been seen with any of the large refractors, and the elongation heretofore seen with more or less certainty may not have been real. The following are the principal positive and negative results:

1851.12	144°.3	0″.41	4*n*	OΣ
1867.31	Single			Δ
1868.26	149?	....		Δ
1875.40	75±	....		Hl
1879.31	153.4	0.35±	1*n*	Sp
1879.37	Single			β
1883.85	142.9	0.27	7*n*	En
1899.33	Single		2*n*	Brown
1898–99	Single		2*n*	Hu

[OΣ (**IX**)...Δ (**I**, p. 228)...Flm...Sp (**II**)...En (2786)...Hl (*Wash. Obsns.* 1875) ...β^3...Brown (3645)...Hu (*Pub. L. O.* **V**)...HΣ(**XII**)...]

$23^m\ 31^s$ **6182.** **β 1324.** The distant component C is entered as "duplex" in Weisse, which doubtless refers to the fainter star A of these measures. The 40-inch shows a small attendant to that. The only measures are:

A and B

1904.19	223°.3	2″.50	3*n*	β^6	9.3...9.9
1904.27	221.3	2.57	1*n*	A	

A and C

1904.19	181°.6	70″.48	3*n*	β^6	...9.1

The A. G. positions give, 181°.6:69″.52 (1877.8).

23 40 **6183.** δ *Corvi.* **Sh** 145. (= **H** **IV.** 105 = σ 415.) These stars appear to be relatively fixed, but have a common proper motion:

Auwers 0″.261 in 240°.1
Bossert 0.251 in 233.4

1866.69	214°.0	24″.34	3*n*	Δ	3.0...8.7
1884.35	214.7	23.63	2*n*	Wilson	
1903.39	214.1	24.40	1*n*	Scott	

[H^3...J^2...Se^1...Se^3...Ra (**XXII**)... Mu... Pk... Δ (**I**)...Tebbutt (*Mon. Not.* **L**, 23)...Engelhardt (**II**)...Wilson (Cin^{10})...Scott (*Mon. Not.* **LXIV**, 52)...]

23 53 **6185.** **β 28.** **B. A. C. 4213.** Discovered with the 6-inch. Porter gives for the principal star (Piazzi XII. 104) a proper motion of 0″.282 in the direction of 261°.7. It is plain that this is a physical system, as this motion is common to the components. There is also slow direct relative motion.

1877.33	355°.1	2″.16	2*n*	Cin
1880.36	356.3	2.01	1*n*	Pt
1885.34	361.1	2.16	1*n*	LM
1889.32	357.0	2.23	3*n*	T
1891.26	368.6	1.81	3*n*	β
1892.34	369.0	2.22	4*n*	T
1898.25	366.9	2.04	3*n*	A
1901.86	367.6	2.14	4*n*	Doo
1905.00	371.7	2.22	4*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351) ... β (3114) (*Pub. L. O.* **II**)... Δ (**I**).... Cin^4 ....WS^2.... LM... Lv^1...Pt....T (3186)....A (3585).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

24 27 **6186.** **Σ 1648.** Unchanged.

1868.50	40°.8	7″.76	4*n*	Δ
1887.36	41.5	8.19	3*n*	Hl

[Ma (*F. S.* **I**)...Ma (**XI**)...Hd...Se...Δ (**II**)...T (2991)...Hl (**II**)...]

24 28 **6187.** **Σ 1647.** *Virginis* 191. A steady advance in the angle, with but little variation in the distance.

1836.32	204°.1	1″.24	2*n*	Σ
1850.66	211.7	1.23	3*n*	Da
1864.29	213.4	1.27	5*n*	Δ
1872.74	217.2	1.26	2*n*	Δ
1879.34	219.6	1.22	3*n*	Hl
1885.37	219.8	1.26	3*n*	Hl
1894.83	220.5	1.24	6*n*	Com
1898.17	223.6	1.33	2*n*	Hu
1903.45	222.7	1.22	2*n*	Biesbroeck

[Ma (*F. S.* **I**) . . . Ma (**XIII, XV**) . . . H^1 . . . Bp . . . Da^3 . . . Se . . . Se^3 . . . En (1518, 1674, 2663) . . . . Δ (1031, 1111, 1256, 1474) . . . . Δ (*Mem. Accad. Sci.*) . . . . Δ (**I, II**) . . . . Ferr . . . OΣ (**IX**) . . . Flm . . . Bru^2 . . . Ra (**XXXVIII**) . . . WS . . . WS^2 . . . Gl . . . Sk . . . Sp (2133) . . . Sp (**II**) . . . Do (2198, 2307, 3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Per . . . Per (2748) . . . T (2991) . . . Lv^1 . . . Hl (*Wash. Obsns.* 1885) . . . Hl (**I, II**) . . . Big . . . Jones (*A. J.* 312) . . . Glasenapp (**II**) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) . . . Maw (**II**) . . . Big (*Bul. Ast.* **XII**, 299) . . . Com (**X**) . . . Brown (3645) . . . HΣ (**XII**) . . . Sk^5 . . . Coleman (*Mem. R. A. S.* **LIII**) . . . . Biesbroeck . . .]

24^m 34^s **6189.** **H 2612.** "Fine; pos. est. from diagram." The only measure is from the Flower Observatory:

1904.04	289°3	12″73	6*n*	Doo	9.3 . . . 12.4

In measuring this, Doolittle found the 9.5 m star, DM (76°) 451, had a small companion. His observations are:

1902.62	53°6	4″30	8*n*	Doo	9.4 . . . 10.5

24 55 **6191.** **A. G. 178.** Double in *A. G. Albany.*

1902.67	288°4	1″24	3*n*	Cogshall

[β^5 . . . Cogshall (*A. J.* 554) . . .]

25 7 **6192.** **Sh 146.** (= σ 416 = OΣ (App) 119.) Without change. B is DM (2°) 2551.

1860.82	289°6	49″36	2*n*	OΣ	7.8 . . . 8.8
1875.82	289.8	49.71	3*n*	Δ	7.2 . . . 8.0
1895.38	289.7	49.96	2*n*	Gla	

[Δ (**I**) . . OΣ (**X**) . . . Glasenapp (**IV**) . . .]

25 24 **6193.** **Σ 1649.** Without change.

1866.94	194°9	15″18	3*n*	Δ
1904.36	194.4	14.87	1*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**VII, VIII**) . . . Se^1 . . . Ra (**XXIII**) . . . Δ (1207) . . . Δ (**I, II**) . . . . Cin^5 . . . . Cin^6 . . . . Wilson (Cin^{10}) . . . . T (2991) . . . . Glasenapp (**I**) . . . . *Annals Toulouse Obsy.* **III** . . .]

25 33 **6195.** **Σ 1650.** Without change.

1866.95	178°6	16″72	3*n*	Δ
1905.05	179.0	16.72	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . β^6 . . .]

25 45 **6196.** **Σ 1651.** Without change.

1868.58	217°9	6″64	4*n*	Δ
1905.05	217.4	6.83	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Se . . . Δ (**II**) . . . β^6 . . .]

26 12 **6198.** **H 211.** "Very delicate; by diagram small star *nf.*" Nothing since H but the following:

1904.17	279°0	10″85	2*n*	β^6	10.9 . . . 11.1

26 16 **6199.** **Hu 571.** No other measure but this:

1903.41	84°4	0″37	1*n*	Bowyer

[Hu (*Bul. L. O.* No. 27) . . . Bowyer (*Mon. Not.* **LXIV**, 797) . . .]

6200. **Σ 1652.** Without change. 26^m 30^s

1867.89	179°5	5″99	3*n*	Δ
1902.43	179.3	6.11	2*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Δ (**II**) . . . Glasenapp (**V**) . . .]

6201. **A. G. 179.** Double in *A. G. Berlin.* 26 45

1902.59	314°8	0″88	3*n*	Miller	8.8 . . . 9.4

[Hu (*Bul. L. O.* No. 44) . . . Miller (*A. J.* 546) . . .]

6204. **Σ 1654.** (= H N. 118 = Sh 147.) Fixed. 27 13

1870.31	23°9	3″84	4*n*	Δ
1905.29	24.9	3.73	1*n*	β

[Ma (*F. S.* **I**) . . . . Ma (**X**) . . . . H (**V**) . . . . WS^2 . . . . Seagrave (*Sid. Mess.* **II**, 274) . . . . Δ (**II**) . . . β^6 . . .]

6205. **H 212.** The only measures are: 27 24

1903.31	264°5	21″70	3*n*	Miller	9.0 . . . 9.3

[Miller (4022) . . .]

6206. **Σ 1653.** Fixed. 27 27

1866.73	341°8	7″78	3*n*	Δ
1903.19	342.7	8.00	1*n*	Hu

[Ma (*F. S.* **I**) . . . . Ma (**XI**) . . . . H^1 . . . . H (**VII**) . . . . Wr . . . . Se . . . . Du . . . . Δ (**II**) . . . . Glasenapp (**II**) . . . .]

6207. **Σ 1656.** Fixed. 27 44

1866.57	25°1	26″94	3*n*	Δ
1905.05	24.7	26.78	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XIII**) . . . Δ (**II**) . . . β^6 . . .]

6208. **Lv 5.** Apparently fixed. 27 53

1900.31	28°1	1″47	3*n*	Hu	7.2 . . . 8.5
1903.30	29.8	1.50	5*n*	Doo	

[Lv^1 . . . . LM . . . . Stone (*A. J.* 156) . . . . Hu (*Bul. L. O.* No. 44) . . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

6209. **β 797.** Discovered with the 15½-inch at the Washburn Observatory. 28 37

A and B

1888.39	170°1	0″75	3*n*	Com
1899.26	164.0	0.53	1*n*	β
1901.28	170.1	0.70	3*n*	Doo
1903.33	169.2	0.61	2*n*	Lewis
1905.11	166.7	0.72	2*n*	Doo

AB and C

1899.07	3°1	77″08	2*n*	β
1901.28	2.7	77.34	3*n*	Doo

[β (**XII**) . . . β^4 . . . Com (**VI**) . . . Brown (3645) . . . Lewis (*Mon. Not.* **LXIV**, 797) . . . Doolittle (*Pub Flower Obsy.* **II**) . . .]

28m 31s **6210.** **Ho 537.** The only later measures are:

1902.34	174°3	1″31	4*n*	Doo

[Ho (3557) ... Doolittle (*A. J.* 547) ....]

29 0 **6211.** **Σ 1658.** The angle of the Struve pair is slowly increasing, and these stars may be physically connected. Lewis has measured an elongation of the principal component, 280°1 : 0″27 (1893.33) 2*n*, but does not refer to it in his subsequent measures of the Σ stars.

1830.64	341°5	2″02	3*n*	Σ
1856.90	348.8	1.90	2*n*	Se
1865.31	349.1	2.67	3*n*	En
1869.08	349.1	2.23	5*n*	Δ
1870.31	350.6	2.37	1*n*	OΣ
1879.37	353.0	2.36	3*n*	Hl
1885.34	353.6	2.36	4*n*	Hl
1893.17	354.8	2.25	2*n*	Jones
1893.33	358.3	2.98	2*n*	Lewis
1894.85	356.3	2.38	6*n*	Com
1905.32	358.7	2.56	1*n*	β

There is a distant star, 8.2 m, in the field, which has some rectilinear motion:

1865.29	256°8	101″9	1*n*	En
1870.31	257.6	102.67	1*n*	OΣ
1881.30	258.2	104.45	1*n*	OΣ
1885.30	258.7	105.23	2*n*	En
1893.18	259.3	106.82	1*n*	Jones
1905.32	260.1	108.23	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Hd ... En (1674, 2742) ... WS ... Gl ... Sk ... Do (2198, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Flm .... Δ (2194) .... Δ (**II**) .... OΣ (**IX**) .... OΣ (**X**, pp. 26, 166) .... Hl (*Wash. Obsns.* 1885) .... Hl (**I, II**) ... Jones (*A. J.* 312) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) .... Com (*Pub. Washburn Obsy.* **X**) ... Brown (3645) ... HΣ (**XII**) ... Thiele (3837) ... Sk^{5} ... β^{6} ...]

29 6 **6212.** 24 *Comae.* **Σ 1657.** (= **H IV. 27** = **Sh 148.**) Fixed.

1866.45	271°0	20″31	3*n*	Δ
1890.22	271.1	20.13	4*n*	Giacomelli
1902.73	271.4	20.55	2*n*	Hu

[Ma (*F. S.* **II**) ... Ma (**XII, XIII, XV**) ... Ma (324) ... H^{1} ... H (**VII**) ... Ba (**II**) ... BM (280) ... Ra (**XXI**) ... Se ... Se^{3} ... En ... OΣ (**IX**) ... Du ... Δ (1207) ... Δ (**I, II**) ... Sp (**II**) ... Per ... Per (2684) ... Pk ... Hl (**II**) ... Glasenapp (**II, III, V**) .... Je (2351) .... Ra (**XLVII**) .... *Annals Toulouse Obsy.* **III** .... Giacomelli (**II**) ....]

29 27 **6213.** **Σ 1660.** No motion.

1868.00	118°5	19″73	3*n*	Δ
1905.12	118.0	19.59	1*n*	β

[Ma (*F. S.* **I**) ... Δ (**II**) ... Cin^{5} ... β^{6} ...]

29 28 **6214.** **H 1218.** (= **β 29** *rej.*) No late measures.

1875.26	258°4	11″24	3*n*	Δ	6.8 ... 11.2

[β (**I**) ... Δ (**I**) ... WS^{2} ...]

(See p. 1074)

6215. **Σ 1659.** The principal stars remain relatively fixed, while the distance of C is increasing, due to the proper motion of AB. Three more distant stars measured by Dembowski. 29m 32s

A and B

1832.28	351°9	27″08	4*n*	Σ
1867.59	351.6	27.24	4*n*	Δ
1881.60	351.3	27.36	5*n*	Sp
1890.41	351.4	27.05	2*n*	Gla
1904.11	351.3	27.37	2*n*	β

A and C

1832.28	68°8	30″92	4*n*	Σ
1867.59	69.2	34.31	4*n*	Δ
1904.11	69.5	36.38	2*n*	β

B and C

1832.28	115°6	36″22	4*n*	Σ
1867.59	113.2	39.01	4*n*	Δ
1904.11	110.5	40.92	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**VII**) ... H (**VIII**) called Σ 1639 ... Ra (**XXIV**) ... Flm ... Δ (1207, 1572) ... Sp (**II**) ... Pt ... Δ (**I, II**) ... Glasenapp (**I**) ... Cin^{5} ... β^{6} ...]

6216. **Σ 1661.** The measures are not very accordant, but there is no doubt of slow direct motion in the angle. These stars have a common proper motion of 0″303 in the direction of 259°8 (Porter), and certainly form a physical system. 29 57

1828.67	226°0	2″56	3*n*	Σ
1843.33	228.2	2.63	2*n*	Ma
1866.60	234.4	2.41	3*n*	Δ
1881.32	235.0	2.63	2*n*	Big
1885.33	233.4	2.55	2*n*	Per
1887.38	235.9	2.43	3*n*	Hl
1894.31	236.3	2.27	4*n*	Com
1898.25	235.4	2.52	6*n*	Doo
1903.23	238.1	2.25	2*n*	Do
1903.28	239.4	2.48	2*n*	Bowyer

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Se^{3} ... Hd ... Flm ... Pt ... Per ... Per (2748) ... Sk^{3} .... Δ (1572) .... Δ (**II**) .... OΣ (**IX**) .... Big .... Glasenapp (**II**) .... Big (*Bul. Ast.* **XII**, 299) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIV**, 797) ... Com (**X**) ... Brown (3645) ... *A. G. Leipzig*, p. 209 ... Doolittle (*Pub. Flower Obsy.* **I**) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Do (3930) ...]

6218. **Σ 1662.** Probably unchanged. 30 16

1866.97	232°4	20″06	3*n*	Δ
1901.82	234.9	19.74	2*n*	Espin

[Ma (*F. S.* **II**) ... Δ (**II**) ... Cin^{5} ... Espin (*Mon. Not.* **LXII**, 529) ...]

6221. **A. G. 180.** "Double?" in *A. G. Berlin.* Single, Hu (*Bul. L. O.* No. 44), and doubtful, Miller (*A. J.* 546). 30 49

6222. **Σ 1663.** (= **OΣ 252** *rej.*) Many of the measures are very discordant in both angle and distance. There may be a little retrograde motion. In Ma (XIII) one measure as OΣ 252. 31 12

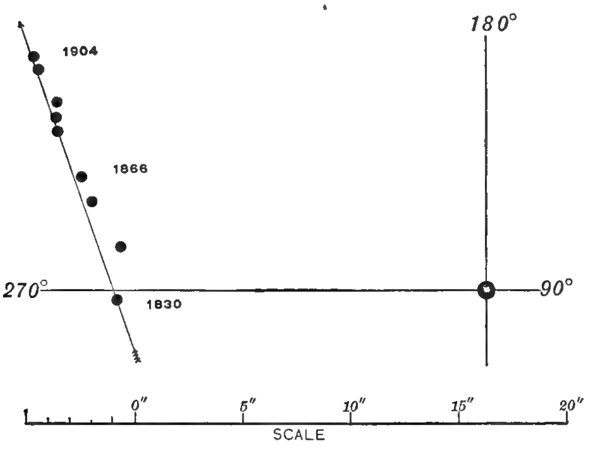
1842.55	124°1	0″72	4*n*	OΣ
1868.55	110.7	0.77	4*n*	Δ
1878.67	110.6	0.67 ±	3*n*	Sp
1887.37	104.7	0.62	3*n*	Hl
1893.36	112.4	0.77	2*n*	Lewis
1899.77	104.4	0.76	3*n*	Hu
1903.28	100.7	0.54	2*n*	Bowyer

[Ma (*F. S.* **I**, 30, 54)... Ma (**IX, X, XI, XIII**)... Da³... Se... OΣ (**IX**)... Δ (2194) ... Δ (**II**)... Flm... WS... WS²... Gl... Sk²... Per... Per (2748)... Do (2198, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (**II**)... En (2663)... Hl (**II**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 797) ... Collins (*A. J.* 378) ... Hu (*Pub. L. O.* **V**) ... Sk⁵...]

$31^{m}\ 18^{s}$ **6223. Pritchett.** From *Pub. Morrison Observatory.* In 1901 I looked for this, and could not find it in or near this place. It should be a short distance *p* the 6 m star, 26 *Virginis.*

[β⁵...]

32 7 **6225. Σ 1664.** "*Red: blue-green,*" H. The distance is increasing from the proper motion of A. The measures of Σ and β give this, 0″.161 in 18°.9.



Σ 1664.

1830.23	271°.6	17″.10	3*n*	Σ
1844.72	263.3	17.08	2*n*	Ma
1858.86	257.3	18.78	4*n*	Ma
1866.28	254.3	19.44	3*n*	Δ
1878.81	249.7	21.12	3*n*	Cin
1885.80	248.1	21.45	2*n*	Wilson
1890.41	246.3	21.75	2*n*	Gla
1898.27	243.7	23.09	4*n*	Doo
1904.15	242.7	23.59	3*n*	β

Distant stars are measured by Glasenapp and WS, and a pair of 11 m stars by Doolittle:

CD	1898.27	265°.4	33″.59	4*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... H (**VIII**)... Hd... WS... WS²... Flm... Gl.... Sk.... Pt.... Δ (1572).... Δ (**II**).... Cin⁵.... Cin⁶.... Wilson (Cin¹⁰).... Glasenapp (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)... β⁶...]

32 14 **6226. H 1219.** The only observations are:

1830+	260°.5	9″±	1*n*	H	11	...11
1880.31	78.9	10.28	1*n*	Big	9.5....9.5	

[H (**V**)... Big...]

6228. H 2616. "Close by a 9 m star is a small, well-defined body which may be a close double star; *np* is a very faint nebula." This is in the field *p* the 6.5 m star, DM (14°) 2523 (= Lalande 23620). The R. A. in H is about 1^{m} too small. The place given in Part I is from a comparison with the large star. $32^{m}\ 27^{s}$

AB	1904.14	280°.1	10″.36	2*n*	β	10.5...12.0
AC	1904.14	314.7	11.48	2*n*	β	...11.7

A and L 23620

1904.26	57°.2	101″.13	1*n*	β	...6.5

[β (*Mon. Not.* **XXXIV**, 375)... β⁶...]

6229. Σ 1665. (= S 640.) Fixed. 32 30

1866.99	98°.0	8″.85	3*n*	Δ
1905.05	98.2	8.74	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H¹... H (**IV**)... Δ (**II**)... β⁶...]

6230. S 639. (= σ 418 = H̶ V. 129.) Some change from proper motion. The following are all the other measures: 32 33

1783.16	96°±	46″.70	1*n*	H̶	
1840.34	106.0	50.23	1*n*	OΣ	7.0...10.0
1881.30	106.4	52.05	1*n*	OΣ	
1897.41	107.3	52.61	4*n*	Doo	
1904.15	107.6	52.54	2*n*	β	8.0... 9.3

[OΣ (**X**)... Doolittle (*Pub. Flower Obsy.* **I**)... β⁶...]

6233. Σ 1666. Fixed. 33 8

1868.80	189°.6	7″.10	4*n*	Δ
1894.34	189.4	7.80	1*n*	Leip

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... *A. G. Leipzig*, p. 209...]

6234. Σ 1667. Unchanged. 34 23

1869.26	41°.0	1″.19	4*n*	Δ
1905.05	40.8	1.13	1*n*	β

[Ma (*F. S.* **I**)... Δ (**II**)... β⁶...]

6236. Σ 1668. Unchanged. 34 50

1866.87	195°.8	1″.71	3*n*	Δ
1888.43	196.6	1.60	3*n*	Hl
1903.36	194.4	1.72	2*n*	Do

[Ma (*F. S.* **I**)... Ma (**XI**)... OΣ (**IX, X**)... Se... Se³... Δ (1207)... Δ (**I, II**) ... Per... Per (2748)... Lv¹... Sp (**II**)... Ho (2978)... Hl (**II**)... Giacomelli (**II**) ... Glasenapp (**II**)... Brown (3645)... *A. G. Leipzig*, p. 248... Do (3930)...]

6237. H 2617. The only measures are: 34 51

1902.31	3°.6	6″.24	2*n*	Es	8.1...8.8

[Espin (*Mon. Not.* **LXII**, 532)...]

35m 2s **6238.** **β 607.** (= **Hd 134.**) Discovered with the 18½-inch. It is 32s directly preceding γ *Virginis.* In DM 9.2 m. So far there has been no change. OΣ measures this star from γ *Virginis* for proper motion of the latter.

1879.75	316°0	1″12	2*n*	β
1889.31	316.3	1.20	3*n*	β
1901.68	315.7	1.02	4*n*	Doo

[β (**X**)...β1...β3...β (2930) (*Pub. L. O.* **II**)... Cin5... Cin6... OΣ (**X**, p. 89)... Hd...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

35 3 **6239.** **Σ 1669.** *Corvi* 58. (= **H̥ N. 38** = **Sh 149.**) The measures since 1842 show no sensible change. The stars have a common proper motion of 0″177 in 276°5 (Bossert).

1842.25	303°3	5″71	2*n*	Ma
1843.32	303.4	5.88	2*n*	Ma
1856.53	302.4	5.78	4*n*	Se
1866.63	302.9	5.57	3*n*	Δ
1875.34	303.9	5.70	4*n*	Sp
1887.37	304.0	5.63	3*n*	Hl
1889.30	303.4	5.63	4*n*	Giacomelli
1896.38	305.5	5.60	2*n*	Scott
1904.36	306.5	5.66	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)... H1... H (**V, VIII**)... Se... Se2...Se3... Ma (324)... BM (280)... Ra (**XXIII**)... Δ (1207)... Δ (**I, II**)... Flm... Sp (**II**)...Pt...En (1674, 2663)...Lv1...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Cin5... Hl (**II**)... Big... Searle (*A. J.* 299)... Glasenapp (**I**)... Maw (**II**)... Scott (*Brit. Ast. Ass'n* **VI**, 368; **VIII**, 66)... Giacomelli (**II**)... Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

35 25 **6241.** **H 2619.** "Fine star." H (VI) 268°6: 30″±: 8...11 (1831+); *yellow : blue.*

35 32 **6242.** 27 *Virginis.* **H̥ VI. 81.** (= σ 419.) This has been entirely neglected for more than a century. The principal star has considerable proper motion:

Auwers	0″155 in 271°1
Bossert	0.162 in 266.5

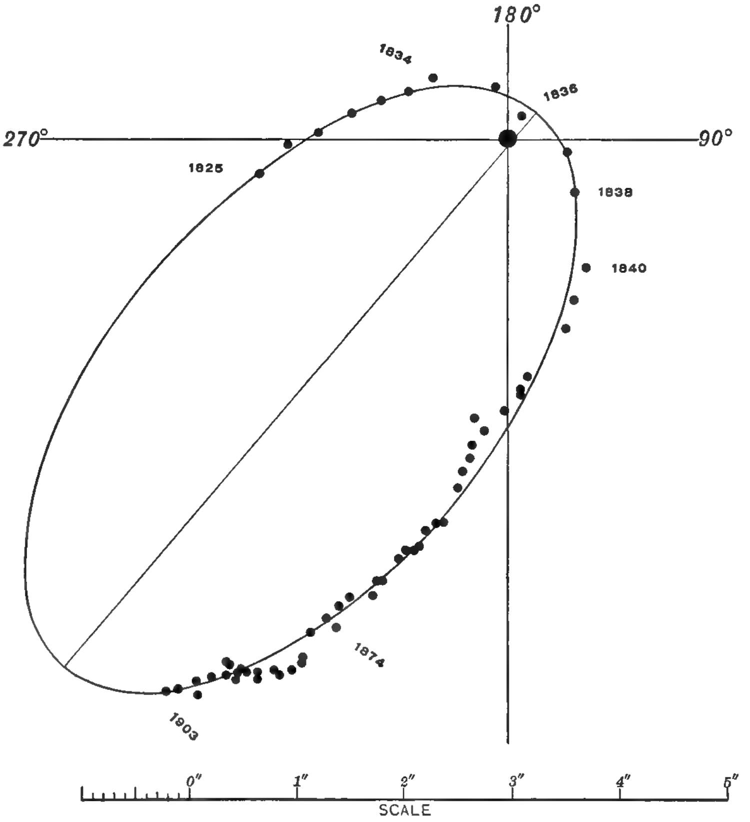
This movement would decrease the distance of the companion about 19″ since 1783, making the distance at that time 104″. The small star is not in DM. The only modern observation is the following:

1904.34 281°8 85″04 2*n* β6 ...9.2

35 37 **6243.** γ *Virginis.* **Σ 1670.** (= **H̥ III. 18** = **Sh 150**; BD = **H 214.**) One of the longest known of the binary systems, and observed as a double star for nearly 200 years. The components have a common proper motion of 0″588 in in 272°0 (Auwers). The faint star, C, was added with the 36-inch.

The following orbits have been computed, the date of the last measure used being given in the first column:

1831	Herschel	513.28 yrs.	*Mem. R. A. S.* V, 188
1833	Herschel	628.90	*Mem. R. A. S.* VI, 149
1838	Madler	157.56	*A. N.* 363
1842	Madler	145.41	*Dorpat Obsns.* IX, p. 168
1843	Henderson	143.44	*Cycle of Celestial Objects* I, 483
1845	Herschel	182.12	*Cape Observations,* 291
1845	Hind	141.30	*A. N.* 543
1846	Jacob	133.5	*Mem. R. A. S.* XVI, 34
1847	Hind	167.03	*Mon. Not.* VII, 287
1847	Madler	169.44	*F. S.* II, p. 235
1848	Herschel	183.14	*Mem. R. A. S.* XVIII, 67
1850	Hind	171.54	*Mon. Not.* XI, 135
1851	Adams	174.14	Gore's *Cat. of Binary Stars*
1851	Fletcher	185.71	*Mon. Not.* XI, 232
1860	Smythe	148.2 177.7	"*Cycle*" continued
1860	Smythe		
1864	Thiele	185.0	*Undersögelse, etc.*, 1866
1867	Reuss	179.	*Bul. Asso. Sci. de France,* 1867
1872	Flammarion	175.	*Comp. Rend.*, LXXVIII, 1196
1881	Doberck	179.6	*Copernicus* I, 143
1893	See	192.07	*Ast. and A.-P.* XII, 870
1895	See	194.0	*Evolution of the Stellar Systems*
1896	Doberck	180.54 179.65 184.87	*A. N.* 3364



γ Virginis. Σ1670

The change in the position of the companion is now very slow, and will continue to be for many years. Some of the recent measures are:

1898.28	330°4	5″94	5*n*	Hu
1901.19	328.8	5.99	6*n*	Doo
1903.71	328.3	5.94	10*n*	Biesbroeck
1905.35	328.5	6.16	8*n*	Doo

The measures which are of any value for the determination of the elements of the orbit commence with Struve. On the diagram are shown sixty yearly positions, representing measures on 246 nights, by the following observers:

1825–1838	Σ	11
1840–1874	OΣ	26
1875–1877	Δ	2
1879–1891	Hl	11
1892–1896	Com	5
1897–1903	Doo	5

The ellipse, representing these observations, gives a period of 193.7 years.

[Ma (*F. S.* **I**, 275; **II**, 235) ... Ma (**IX, XI, XIII, XV**) ... Ma (363, 413, 430, 452) ... BM (280) ... Σ¹ ... H¹ ... H² ... H³ ... H (**IV, VII, VIII**) ... H (*Mem. R. A. S.* **V**) ... Ek (**I, II**) ... Bes ... Bp ... Da (*Mem. R. A. S.* **V**, 139) ... Da¹ ... Da² ... Da³ ... Da⁴ ... Auwers (1393) ... K ... K (409, 1519) ... Wr ... Mh ... *Gr. Obsns.* 1842–59 ... P¹ ... P² ... J² ... J³ ... WJ ... WJ² ... Fl ... Fl (768) ... Fl (*Mon. Not.* **X**, 158; **XI**, 167, 232) ... Miller (848, 863) ... Miller (*Mon. Not.* **XIII**, 223) ... Mu ... Wn (**V**) .... Wn (1738) .... Se .... Se² .... Se³ .... Se (*Comp. Rend.* **XLI**, 271; **XLVIII**, 375) ... Se (975, 1614) ... Ra (**XXI** to **XXXIX, XLVII**) ... Hind (543) ... Hind (*Mon. Not.* **VI**, 1; **VII**, 287; **XI**, 135) (*Mem. R. A. S.* **XVI**, 21, 461) ... Cooper (2155) .... Schmidt (1543) .... Hartnup (*Mon. Not.* **X**, 36) .... Ba (**I, II, III, IV**) ... Lu (**II, III**) ... Smythe (*Mon. Not.* **XVII**, 262; **XVIII**, 316) ... Bond (*Am. Acad.* **II**, 144) ... Thiele (*Undersögelse af Omlöbsbevægelsen i Dobbelstjernesystemet γ Virginis*, 1866) ... Baxendell (*Mon. Not.* **XVIII**, 11) ... Bru .... Reuss (*Bul. hebdomadaire de l'Asso. Sci. de France*, 1867, **II**, 246) .... Perry (*Eng. Mech.* **XXXVIII**, 192) .... En (1518, 1674, 2663, 2742) .... Flm .... Flm (1998) ... Flm (*Études et lectures sur l'ast.* **VI**) ... Flm (*Comp. Rend.* **LXXVIII**, 1196) ... Flm (*Mon. Not.* **XXXIV**, 426) ... Wh ... Nobile (*Rend. della R. Accad. Sci.* Nov. 1875) ... Amici (2155) ... OΣ (1411) ... OΣ (**IX**) (**X**, pp. 89, 166) .... Δ (*Mem. Accad. Sci.*) .... Δ (1031, 1111, 1185, 1256, 1474, 1572, 1735, 1798, 1886, 1979, 2079, 2193) ... Δ (**I, II**) ... Hd ... Du ... Kn ... WS ... WS² ... Gl ... Sk ... Sk² ... Sk³ ... Pl ... Pk ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) (*Copernicus* **I**, 143) (2198, 2433, 3023) ... Burton (*Copernicus* **I**, 54) ... Pt ... Waldo (2190) .... Je (2351, 2449) .... Hl (*Wash. Obsns.* 1876, 1880, 1881, 1883, 1884, 1886) ... Hl (**I, II**) ... Hayn (3051) ... Sp (2133) ... Sp (**I, II**) ... Sp (**II**, App.) ... Goldney (2257) ... Kustner (2584) ... Franz (2590) ... Per ... Per (2684) ... T (2866) ... Cin³ ... Cin⁴ ... Cin⁵ ... Cin⁶ ... Wilson (Cin¹⁰) ... Tebbutt (*Mon. Not.* **XLVI**, 50; **L**, 23; **LIII**, 369) ... Johnson (*Liverpool Ast. Soc.* **V**, 113) ... Perry (*Ast. Reg.* **XIX**, 176) .... Lv¹ .... Lv (*A. J.* 278) .... *Proc. Haverford Coll. Obsy.* 1891, 1892 ... Jones (*A. J.* 312) ... Knorre, See, and Wellman (*Beob. Berlin*, No. 6, 1892) ... Ho (2978, 3234, 3558) ... Glasenapp (**I, II, III, IV, V**) ... Maw (**I, III**) ... Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 248) (*Mon. Not.* **LXIV**, 52) ... β³ ... β (2930) (*Pub. L. O.* **II**) ... Sp (**III**) ... Cohn (3240) ... Big ... Big (*Bul. Ast.* **XII**, 299) .... Hagen (3258) .... Tebbutt (*Mon. Not.* **LVI**, 353) .... Everett (*Mon. Not.* **LVI**, 464) ... Collins (*A. J.* 378) ... Com (*Pub. Washburn Obsy.* **X**) .... Searle (*A. J.* 299) .... Do (3364, 3370, 3378, 3799) .... Brendel (*A. J.* 361, 363) ... See (*Evolution of the Stellar Systems*) (*Ast. and A.-P.* **XII**, 870) ... See (3314, 3496) (*A. J.* 349, 378) .... Hu (*A. J.* 397) .... Chofardet (3450) .... A (*A. J.* 429) ... Coleman (*Mem. R. A. S.* **LIII**) ... Giacomelli (**II**) ... Tebbutt (*Mon. Not.* **LXI**, 501; **LXIV**, 61) ... Gl (*Mon. Not.* **LXI**, 556) ... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**) .... *Annals Roy. Obsy. Edinburgh* **I**, p. 188 .... Thiele (3837) .... Doolittle (*Pub. Flower Obsy.* **I, II**) (*A. J.* 416, 547, 564) .... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 503, 518; **LXI**, 486; **LXII**, 383; **LXIII**, 403) ... Biesbroeck ...]

$35^m\ 46^s$ **6244.** **Ho 54.** Later observations are the following:

AB	1904.05	101°.5	118″.86	2*n*	β	
BC	1904.05	148.6	2.00	2*n*	β	10...10
	1902.35	149.4	1.75	3*n*	Doo	
BD	1904.05	62.6	10.82	2*n*	β	...13.6

[Ho (2778) ... β⁶ ...]

35 52 **6245.** 31 *Virginis.* **β 924.** Discovered with the 18½-inch. The proper motion of this star is 0″.106 in the direction of 273°.2 (Auwers.) With this movement and the measures of 1880, the small star, if fixed in space, should be at the date of the measures in 1899, 50°.7 : 4″.88.

1891.24	29°.0	3″.94	3*n*	β
1899.06	31.8	3.79	2*n*	β
1901.47	28.2	3.92	4*n*	Doo

[β (**XIII**) ... β³ ... β⁴ ... β (3114) (*Pub. L. O.* **II**) ... Perry (*Eng. Mech.* **XXXVIII**, 192) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

6246. **♅ N. 143.** The place is doubtful in ♅. I could not find any pair here. There is no doubt of its identity with Σ 1674. (No. 6253.) 36^m :^{s}

6247. **Σ 1647** *rej.* The only measures are: 36 6

AB	1905.33	201°.5	29″.24	1*n*	β⁶	8.5...10.0
AC	1905.33	144.9	39.95	1*n*	β⁶	... 9.8

6250. **Σ 1672.** Fixed. The Decl. in *Pos. Med.* is 10′ too small. 36 50

1868.02	312°.9	4″.33	4*n*	Δ
1905.11	312.4	3.92	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Δ (1475) ... Δ (**II**) ... β⁶ ...]

6252. **Hu 738.** No other measures. 37 33

[Hu (*Bul. L. O.* No. 65) ...]

6253. **Σ 1674.** (= **♅ N. 143.**) Probably fixed. 37 43

1866.74	171°.3	2″.16	4*n*	Δ
1893.31	179.8	1.66	2*n*	Gla
1894.37	172.2	2.38	1*n*	Leip

[Ma (*F. S.* **I**) .... Ma (**XI**) .... Se .... Δ (**II**) .... Glasenapp (**II**) .... *A. G. Leipzig*, p. 248 ...]

6254. **Ho 380.** Probably fixed. 37 51

1895.33	348°.5	2″.06	2*n*	Ho
1903.32	351.6	1.65	3*n*	Doo

[Ho (3233, 3558) ...]

6255. **H 1221.** "Fine coarse double star. *Red: blue.* A neb. *f.*" The only pair I could find on one occasion was O. Arg. N. 13046 and 13045, estimated 320°: 30″: 8...8+. The place of this is: 38 :

R. A. = $12^h\ 44^m\ 56^s$ }
Decl. = 74° 14′ }

The nebula referred to is probably Dreyer 4750, which is 55^s *f* the last-named place, and 42′ *s*.

6256. **OΣ 253.** Unchanged. 38 3

1869.96	237°.8	6″.46	5*n*	Δ
1898.25	237.7	6.58	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Pl ... Ho (2978) ... Hu (*Pub. L. O.* **V**) ...]

38^{m} 18^{s} **6257.** **OΣ** 254 *rej.* From *Poulkowa Catalogue* of 1843; rejected as single in the second edition. The only measure is by Ma, 188°9: 0″3± (1852.69) 1*n*. Dembowski found it single in 1868, and Hussey in 1898 with the 36-inch.

[Ma (**XIII**)... Δ (**I**, p. 229)... Hu (*Pub. L. O.* **V**)...]

38 23 **6258.** **Ho** 256. The following, which are all the measures, appear to show motion in angle:

1887.40	101°9	0″5±	1*n*	Ho
1893.42	115.5	0.53	2*n*	Ho
1901.24	130.6	0.49	1*n*	Lewis
1904.38	117.6	0.54	6*n*	Doo

[Ho (2977, 3234, 3558)... Lewis (*Mon. Not.* **LXII**, 383)...]

38 40 **6259.** **Σ** 1675. (= **H** 520.) Change in distance?

1866.59	8°6	30″54	3*n*	Δ
1905.11	6.8	30.21	1*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)... β^{1}... β^{6}...]

38 44 **6260.** **Σ** 1676. Fixed.

1867.92	348°9	4″17	3*n*	Δ
1895.42	351.4	4.73	2*n*	Collins

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Du... Δ (**II**)... Collins (*A. J.* 378)...]

39 7 **6261.** **Σ** 1677. (= **H** **III.** 53 = **Sh** 151.) Fixed.

1867.27	348°0	15″79	3*n*	Δ
1890.30	347.5	15.90	4*n*	Giacomelli
1904.35	347.8	16.05	1*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... Se... Se^{3}... Ra (**XXIII**)... Δ (1207)... Δ (**I, II**)... Cin^{5}... T (3185)... Glasenapp (**I**)... *Annals Toulouse Obsy.* **III**... Giacomelli (**II**)...]

39 11 **6262.** **H** 521. The only measures are:

1875.36	2°9	32″78	1*n*	Hl	
1904.19	4.1	33.71	2*n*	β	7.4...13.7

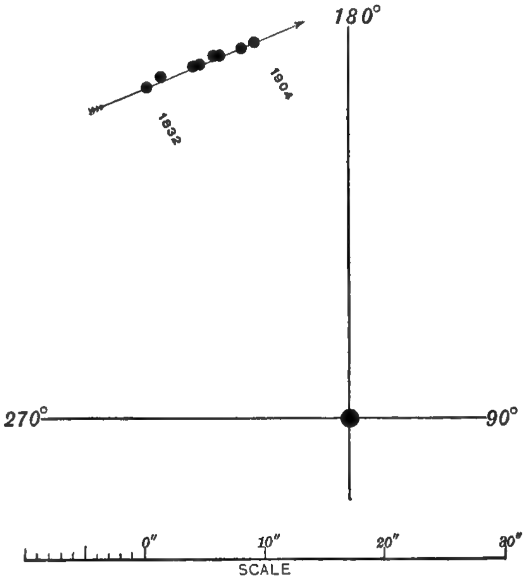
[Hl (**I**)... β^{6}...]

39 26 **6263.** **Σ** 1678. (= **S** 641 = **H** 216 = **Σ** 22 **App. I** = **OΣ (App)** 120.) The change, principally in angle, is due to proper motion. According to Rechenberg the largest proper motion, from meridian positions, is in the smaller component. He gives:

A = 0″077 in 295°4
B = 0.686 in 92.3

This would indicate a system of the 61 *Cygni* class. The apparent movement of the companion, from the measures, is 0″136 in 111°8.

1832.27	211°6	32″60	6*n*	Σ
1842.62	209.0	32.73	4*n*	OΣ
1863.23	204.0	32.14	4*n*	Δ
1867.65	203.0	32.24	3*n*	Δ
1877.83	200.5	32.31	10*n*	Je
1883.34	199.7	32.15	6*n*	En
1894.68	196.3	32.16	4*n*	Franz
1904.27	194.3	32.40	2*n*	β



Σ 1678

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Da^{3}... Da^{4}... Ra (**XXVI, XXXVIII**)... Du.... Do (2198) (*Trans. R. I. Acad.* **XXIX**, Part 13).... Schur (2255).... Je (2338, 2351)... Flm... Δ (1185, 1474)... Δ (**I, II**)... Per... Pl... Bru^{2}... Per (2748)... En (2663)... Sk... WS... Gl... OΣ (**IX**)... OΣ (**X**, pp. 26, 167)... Glasenapp (**II, III, IV**)... Rechenberg (3482)... Franz (3264)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Sk^{5}... Giacomelli (**II**)... Lau (*Bul. Ast.* **XXII**, 238)... β^{6}...]

(See p. 1074)

6265. **H** 217. "Triple; nearly an equilateral triangle." 39^{m} 51^{s}

6266. **O. Stone** 24. From Cin^{5}. In Cin^{6}, for the same observation, the angle is given 272°4. The place given does not agree with that of any star in SD. 40 2

6267. **OΣ** 255 *rej.* From *Poulkowa Catalogue* of 1843. Excluded in the edition of 1850 by reason of the faintness of the companion. Not seen by Dembowski in 1866; readily seen by me with the 6-inch in 1875. The only measures are: 40 8

1845.31	333°9	21″	1*n*	Ma
1878.28	337.6	20.20	1*n*	β
1897.41	338.6	19.87	4*n*	Doo
1899.30	339.1	19.07	3*n*	Hu

[Ma (**XIII**)... Δ (**I**, p. 229)... β^{1}... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

$40^m\ 28^s$ **6268.** **Σ 1679.** Fixed. The principal star is given a proper motion of 0″083 in 90° (*A. G. Harvard*)

1867.88	207°6	5″67	4*n*	Δ
1879.32	207.0	5.71	1*n*	Cin

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)...Seagrave (*Sid. Mess.* **II**, 274)... Δ (**II**)... Cin^5...]

41 28 **6269.** **A. G. 181.** "Double?" in *A. G. Leiden*. I found it single, 1904.26.

[β^6...]

41 58 **6271.** **β 459.** Discovered with the 6-inch. Without change.

1880.61	292°6	3″50	2*n*	Pt
1893.39	295.0	3.91	3*n*	W
1898.28	292.9	3.76	3*n*	A

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)... Δ (**I**)...Pt...Wilson ( )...A (3585)...]

42 16 **6272.** **A. G. 182.** Double in *A. G. Leiden*. Measures by β^6.

42 49 **6274.** **S 642.** Probably change from proper motion.

1879.85	30°5	58″12	2*n*	β^3	8.4...9.0
1897.38	29.4	59.65	6*n*	Doo	
1904.27	29.1	59.68	2*n*	β	8.6...8.8

[β^3... Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

43 **6275.** **O. Stone 25.** From Cin^5; approximate place.

43 4 **6276.** **Hn 117.** (= **Ku 43.**) No motion.

1901.87	17°0	2″53	2*n*	Ku

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Kustner (3821)...]

43 18 **6277.** **Σ 1680.** Not seen double in H (V), but observed in H (VI), and magnitudes given, 9-10...11. Seen with the 6-inch, 1875, but companion fainter than 11 m of H. Δ found 9.3...10.8. Relatively fixed. The principal star is given a proper motion of 0″088 in 250°2 (*A. G. Berlin*).

1868.26	340°9	3″04	3*n*	Δ
1902.37	338.5	3.02	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V, VI**)...Δ (**II**)...Cin^5...]

43 29 **6278.** **Σ 1681.** (= **Sh 152.**) Fixed.

1868.30	195°3	8″54	4*n*	Δ
1904.35	195.5	8.94	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV, V**)...Wr... Se... Δ (**II**)... T (2991, 3185)... Glasenapp (**II**).... *Annals Toulouse Obsy.* **III**....Coleman (*Mem. R. A. S.* **LIV**)...]

44 47 **6281.** **Hu 640.** With two later measures the mean is:

1903.74	104°2	0″39	3*n*	Hu	9.3...9.3

[Hu (*Bul. L. O.* No. 57)...]

6283. **Σ 1717.** Companion not seen by Dembowski, 1865; plain with the 6-inch, 1876. Nothing but the following since Struve: 45^m :^{s}

1879.33	343°3	8″32	1*n*	β	8.3...9.3
1899.31	331.7	8.09	3*n*	Doo	

[Δ (1736)...β^3...Doolittle (*Pub. Flower Obsy.* **II**)...]

6284. **Σ 1682.** The later measures make the distance less. 45 8

1865.83	306°7	32″27	4*n*	Δ
1878.27	305.8	32.35	3*n*	β
1890.43	305.8	32.16	2*n*	Gla
1904.35	304.5	31.75	1*n*	Hu

[Ma (*F. S.* **I**)...H (**VIII**)...Δ (1572)...Δ (**II**)...Flm...β^1...Glasenapp (**I**)...]

6286. **Σ 1683.** Fixed. 45 28

1867.63	197°2	15″48	3*n*	Δ
1905.05	197.3	15.50	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

6287. **H 522.** There is nothing in H's place, which is $2^m\ 24^s$ *p* this. Identified as 30 *Comae*, the place of which is given here. The large star has a proper motion of 0″115 in 287°7, and the companion appears to be moving with it. 45 51

1878.15	10°0	43″17	1*n*	β^1	
1901.34	11.7	42.92	3*n*	β^5	6...11.7

6288. **H 849.** Found and estimated, 280° : 5″ (1877). 45 52

6289. **Σ 1685.** (= **H̤ IV. 58** = **Sh 153.**) Without change. Two distant stars given in Sh. The proper motions are given in *A. G. Berlin*: 45 59

A = 0″060 in 289°5
B = 0.042 in 270.0

1866.88	201°1	15″89	3*n*	Δ
1889.36	201.2	15.70	5*n*	Giacomelli
1902.37	202.5	16.19	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)... Da^3... Se^1... H (**II, V**)...*Durham Obsns.* 1846-48 ....Ra (**XXIII**).... Δ (1031, 1256)....OΣ (**IX**)(**X**, p. 205).... Δ (*Mem. Accad. Sci.*)... Δ (**I**, p. 62, 409)... Δ (**II**)... Per... Per (2684)... Pt... En (2662)... Hl (**I**).... Big....Glasenapp (**III, V**)....*Annals Toulouse Obsy.* **III**....Giacomelli (**II**)...Lau (*Bul. Ast.* **XXII**, 238)...]

6290. **Σ 1684** *rej.* From *Catalogus Novus*. The only measure is the following: 46 2

1905.22	267°5	29″21	1*n*	β^6	7...10.5

DM (26°) 4398 is in the field, 202°0 : 133″2.

6291. **H 523.** "Neat star." Apparently unchanged (1877). 46 9

$46^{m}\ 14^{s}$ **6292.** **32 and 33** *Comae.* **Σ 23, App. I.** Very little change, if any. The proper motions from Auwers are:

32 *Comae*	0″.050	in	270°.0
33 *Comae*	0.065	in	138.8

1870.32	49°.2	195″.05	5*n*	Δ
1887.67	49.3	195.20	6*n*	Je
1898.38	49.4	195.55	2*n*	Gla

[Se^{1}...Ra (**XXVI**)...Δ (**II**)...Je (2338)...Glasenapp (**V**)...]

46 25 **6293.** **H 2621.** "An elegant triple star; equilateral triangle; side = 40″" The position-angle of the larger stars is about 270° (1877).

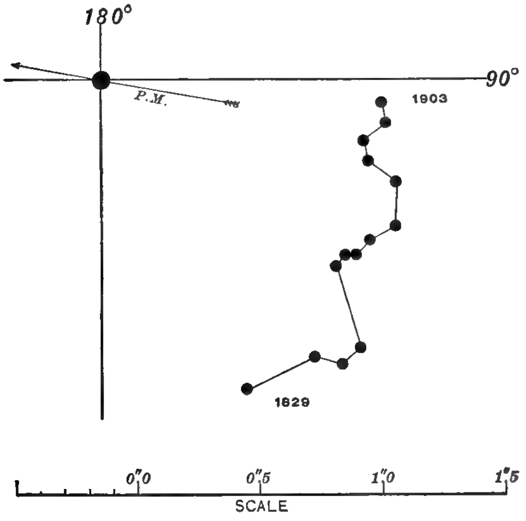
46 42 **6294.** **H 524.** H (V) 111°.8:15″±:9-10...11-12 (1830+).

46 59 **6295.** **Σ 1686.** *Virginis* 359. (= **Sh 155.**) Fixed. The proper motion of the principal star is 0″.051 in 334°.8 (*A. G. Berlin*).

1867.26	187°.1	5″.31	3*n*	Δ
1897.31	187.6	5.24	4*n*	Coleman

[Ma (*F. S.* **I**)....Ma (**XI**)....Se....Se^{3}....Wr....Ra (**XXIII**)....Du....WS^{2}.... Δ (1207)...Δ (**I, II**)...Knorre (*Beob. Berlin* No. 6, 1892)...Giacomelli (**II**)... Per...Per (2748)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

47 23 **6296.** 35 *Comae.* **Σ 1687.** (AC = **H V. 130 = Sh 154.**) Possibly a binary of very long period, but the best measures during the past sixty years show no sensible variation from rectilinear motion, as will be seen from the positions here given. The system has a proper motion of 0″.099 in 260°.7 (Auwers).



35 Comae. Σ 1687

1829.99	25°.3	1″.43	5*n*	Σ
1842.81	37.6	1.46	9*n*	Da
1844.34	40.1	1.55	3*n*	OΣ
1853.90	43.7	1.56	6*n*	Da
1864.03	51.1	1.26	11*n*	Δ
1867.50	53.9	1.26	7*n*	Δ
1872.38	55.4	1.30	8*n*	Δ
1876.37	59.7	1.31	9*n*	Δ
1879.41	63.0	1.37	4*n*	Hl
1885.36	70.3	1.30	3*n*	Hl
1891.24	72.4	1.18	3*n*	β
1896.26	76.3	1.12	3*n*	Com
1897.92	80.7	1.20	3*n*	Hu
1903.34	84.6	1.18	3*n*	Bowyer
1905.25	79.2	1.40	8*n*	Doo

From the measures to 1891, Gore deduces a period of 228.42 years.

There is no change in the distant star:

1866.58	125°.2	28″.52	4*n*	Δ
1885.36	124.8	28.71	3*n*	Hl
1903.45	125.5	29.11	2*n*	Biesbroeck

[Ma (**XI, XIII, XV**)...Wr...Da^{3}...Da^{4}...Bp...Se...Se^{2}...Se^{3}...Ba (**II, IV**) ...Mh...Hd...WS...WS^{2}...Sk...Sk^{2}...Sk^{3}...Gl...Pk...Pl...Flm... En (1674, 2663)...Bru^{2}...Δ (1111, 1185, 1474, 1735, 1886, 2079)...Δ (**I, II**)... OΣ (**IX, X**)...Do (2198, 2303, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Sp (2133)...Sp (**II**)...Per...Per (2748)...Perry (*Ast. Reg.* **XIX**, 176)...Perry (*Eng. Mech.* **XXXVIII**, 192)...T (2898)...Ho (2978)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Gore (*Proc. R. I. Acad.* 3d series, **II**, 34) orbit...Big... β (3114)...Glasenapp (**II**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)....Maw (**II, III, IV**) ...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (*Pub. Washburn Obsy.* **X**)...β (*Pop. Ast.* **V**, 125)...Hu (*A. J.* 427)...Ho (3558)...Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)...Boeger (*A. J.* 522)....Sk^{5}...Biesbroeck...]

(See p. 1074)

6297. **O. Stone 26.** (= **Hd 135.**) Probably unchanged. $47^{m}\ 25^{s}$

1905.19	29°.6	2″.89	3*n*	Doo

[Hd...Cin^{3}...Cin^{4}...β^{4}...]

6299. **S 643.** The only measures since 1825 are: 47 40

1896.43	294°.5	23″.40	3*n*	A (3395)

6300. **H 1222.** "Strongly suspected close double." Carefully examined on first-class night (1876) with the 6-inch; three small stars near this place, but no close pair. Looked for by Aitken with the 36-inch in 1896, and no close pair found. 47 40

[A (3395)...Espin (*Mon. Not.* **LXII**, 533)...]

6301. **H 4556.** In another observation magnitudes, 6½...8. Both stars in Yarnall, 7.0...8.5. Unchanged. 47 48

1897.41	81°.5	6″.52	1*n*	See

[H^{3}....WJ....WJ^{2}....Cin^{4}....Glasenapp (**I**)....See (3496)....Scott (*Mon. Not.* **LXIV**, 52)....]

6302. **Σ 1688.** Fixed. The components appear to have a common proper motion of 0″.152 in 90°. 47 53

1866.93	345°.4	14″.42	3*n*	Δ
1902.12	345.0	14.41	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

48m 13s **6303.** **Σ 1694.** *Camelop.* 32 (Hev.). (= **♅ IV. 15.**) Fixed. The proper motions by Bossert are:

A = 0″035 in 304°2
B = 0.033 in 307.2

1866.62	327°2	21″76	3*n*	Δ
1872.99	326.9	21.63	2*n*	Du

[Ma (*F. S.* I)...Da³...Σ¹...Ra (**XXII**)...Δ (1207)...Δ (I, II)...Pk...OΣ (**IX**)...Du...Hunt (*Observatory* **III**, 605)...Je (2351)...]

(See p. 1074)

49 22 **6306.** **H 4558.** Probably fixed.

1836.34	179°1	25″40	1*n*	H	9 ... 9
1837.38	177.5	21.78	1*n*	H	10 ...10
1879.39	182.9	26.68	2*n*	Cin	8.5... 9.0

[H³...Cin⁵...]

49 29 **6307.** **Σ 1689.** (= **Sh 157.**) Probably some change in the angle.

1866.21	203°0	28″59	3*n*	Δ
1897.38	207.3	28.76	5*n*	Doo
1899.35	207.4	29.14	3*n*	Coleman

[Ma (*F. S.* **II**)....Ma (**XIII, XV**)....H (**V, VII**)....WS²....Δ (**II**)....Doolittle (*Pub. Flower Obsy.* **I**)...*A. G. Leipzig*, p. 209...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...]

49 34 **6308.** δ *Virginis.* This has a proper motion of 0″499 in 263°1 (Boss). The change in the companion, shown by the recent measures, exactly corresponds to this movement.

1901.29	139°6	158″07	3*n*	β	...10.5

[β³...β⁵...]

49 50 **6309.** **Σ 1691.** Without change.

1867.86	276°2	18″90	4*n*	Δ

[Ma (*F. S.* **II**)...H¹...H (**V**)...Seagrave (*Sid. Mess.* **II**, 274)...Δ (**II**)...]

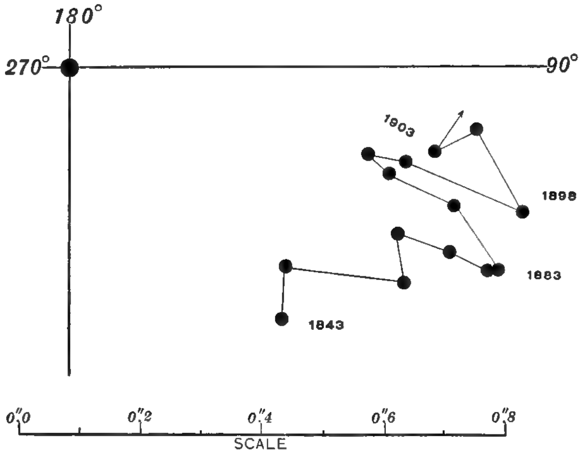
50 4 **6311.** **Σ 1690.** (= **♅ II. 42 = H 219 = Sh 156.**) Fixed.

1866.59	147°5	5″94	3*n*	Δ
1880.30	149.5	6.05	1*n*	β
1904.35	148.0	6.00	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Bp...Da³...Wr...H (**V**)...Ba (**II**)...Se...Se³...OΣ (**IX**)...Δ (**II**)...Cin⁵...Cin⁶...β³...Glasenapp (I)...T (3185)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

50 17 **6312.** **OΣ 256.** Slow direct motion. The angle is reversed by some observers. The best of the measures are too discordant to furnish any clue to the character of the relative motion. The components are given a proper motion of 0″084 in 180° (*A. G. Nico.*).

1843.27	40°4	0″55	2*n*	Ma	
1846.58	47.6	0.49	5*n*	Ma	
1848.70	57.2	0.66	6*n*	OΣ	7.2...7.6
1870.76	62.9	0.61	7*n*	Δ	7.1...7.5
1875.36	64.1	0.7±	4*n*	Sp	
1879.37	64.0	0.77	2*n*	Cin	
1883.47	64.5	0.79	6*n*	En	6.9...7.3
1885.41	70.0	0.68	2*n*	Per	7.2...7.4
1887.37	71.5	0.56	3*n*	Hl	
1894.39	73.7	0.52	2*n*	Com	
1895.40	73.9	0.58	3*n*	Com	
1898.35	72.1	0.79	3*n*	A	
1901.87	81.1	0.68	3*n*	Doo	
1903.38	77.0	0.62	2*n*	Biesbroeck	



OΣ 256

[Ma (**XI, XIII**)...OΣ (**IX**)...Sp (2133)...Sp (**II**)...Do (2322, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Hd...Flm...Pt...Per...Per (2749)...En (2678)...Tebbutt (2837)... Tebbutt (*Observatory* **X**, 391)... Δ (**I**)...Cin⁴...Cin⁵...Cin⁶....Hl (**II**)....Big....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIV**, 798)...Wilson (Cin¹⁰)...Barnard (*A. J.* 447)...Com (*Pub. Washburn Obsy.* **X**)....Brown (3645)....A (3585)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**).... Maw (**IV**).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...Biesbroeck...]

6313. 12 *Canum Ven.* **Σ 1692.** (= **♅ IV. 17 = Sh 158.**) 50m 25s
No change in the positions of these stars, but they have a common proper motion of 0″257 in the direction of 284°0 (Auwers).

1865.96	227°6	19″96	3*n*	Δ
1889.35	227.5	19.66	4*n*	Giacomelli
1898.43	227.4	19.76	2*n*	Gla

[Ma (**X, XI, XII, XIII, XV**)...Ma (324)... Ma (*F. S.* **I**)... H¹... H (**IV, V, VI**)...P¹...J²...Se¹... Ra (**XXIII**)... OΣ (**IX, X**)... Δ (1111, 1256)... Δ (**I, II**)... Du... Pk... Hd... Je (2351)... Pt... Per... Engelhardt (**II**)...Glasenapp (**III, IV, V**)....Giacomelli (**II**)....Coleman (*Mem. R. A. S.* **LIII**)....*Annals Toulouse Obsy.* **III**...Lau (*Bul. Ast.* **XXII**, 238)...]

6314. **Σ 1697** *rej.* From *Catalogus Novus.* Identified 50 34
and measured:

1905.33	218°2	28″18	1*n*	β⁶	8.6...9.2

50^{m} 36^{s} **6315.** **Σ 1693.** Without change.

1867.91	331°.5	8″.48	3*n*	Δ
1894.37	333.2	8.67	1*n*	Leip

[**Ma** (*F. S.* **I**)...**Ma** (**XI, XV**)...**H**^{1}...**H** (**V**)...Δ (**II**)...*A. G. Leipzig*, p. 248...]

50 38 **6316.** **Ho 538.** No change.

1902.35	114°.9	2″.31	3*n*	Doo

[**Ho** (3557)...]

50 55 **6317.** **Σ 1698.** Fixed.

1867.90	109°.9	10″.03	4*n*	Δ
1905.29	109.4	10.13	1*n*	β

[**Ma** (*F. S.* **I**) ... **Ma** (**X, XIII, XV**) ... **H** (**V**) ... **Do** (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13).... Δ (**II**) .... β^6....]

51 3 **6318.** **Σ 1695.** *Ursae Majoris* 417. (= **Sh** 159.) This is B. A. C. 4348. No material change, but the stars have a common proper motion.

Kustner	0″.093 in 266°.3
Bossert	0.095 in 270.0

1870.56	286°.1	3″.35	5*n*	Δ
1881.29	287.0	3.43	1*n*	β
1894.60	283.4	3.67	2*n*	Gla

[**Ma** (*F. S.* **II**) ... **Ma** (**XIII, XV**) ... **H**^{1} ... **H** (**V**) ... **Ra** (**XXVI**) ... **Se**... **Wr** ... **OΣ** (**IX**) ... **Bl** (**V**). Δ (1207) ... Δ (**I, II**) ... **En** (1518, 1674) ... **Du**... **Per**... **Per** (2748) ... **Seagrave** (*Sid. Mess.* **II**, 274) ... β^4... **Glasenapp** (**III**) ... **Knorre** (3632) ... **HΣ** (**XII**) ....]

51 6 **6319.** **β 925.** Discovered with the 18½-inch. Kustner gives the proper motion of this star 0″.019 in 294°.9. The measures do not cover a sufficient time to show whether or not the motion belongs to both stars. This is a naked-eye star in *Canes Venatici*. The following are all the later measures:

1882.41	209°.5	6″.48	2*n*	Ho	6.5...13.0
1892.13	211.9	6.90	3*n*	β	6.3...11.4
1899.08	211.6	6.77	1*n*	β	6.8...12.5
1905.33	211.8	6.63	1*n*	β	

[β (**XIII**)...β^3...β (3142)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...**Ho**(2978) ...β^6...]

51 13 **6320.** **A 146.** No other measures.

[**A** (3741)(*Bul. L. O.* No. 3)...]

51 15 **6321.** **OΣ 257.** (= **H** 2625.) No change.

1868.20	353°.6	12″.81	4*n*	Δ
1898.25	352.6	13.11	3*n*	Hu
1903.28	353.3	12.89	3*n*	Do

[**Ma** (**XI, XIII**)...**OΣ** (**IX**)...**H** (**V**)...**Ba** (**I**)...Δ (**I**)...**Sk**^{3}...**Big**...**Hu** (*Pub. L. O.* **V**)...**Boeger** (*A. J.* 522)...**Sk**^{5}...**Do** (3930)...]

51 32 **6323.** **O. Stone 27.** No motion.

1901.47	67°.4	2″.13	1*n*	Hu	8.5...8.7

[**Cin**^{5} ... **Cin**^{6} ... **Wilson** (**Cin**^{10}) ... **Lv**^{1} ... **Jones** (*A. J.* 312) ... **Hu** (*Bul. L. O.* No. 44)...]

6324. **Σ 1696.** Fixed. 51^{m} 38^{s}

1868.75	202°.7	3″.45	4*n*	Δ

[**Ma** (*F. S.* **I**)....**Ma** (**XI**)....**H** (**V**)....**Ra** (**XXIV**) .... Δ (1207).... Δ (**I, II**).... *Annals Toulouse Obsy.* **III**...]

6326. **β 926.** Discovered with the 18½-inch. Probably no motion. 52 14

1892.24	274°.8	2″.24	3*n*	β
1892.33	269.9	2.23	3*n*	Lv
1901.58	271.9	2.28	7*n*	Doo

[β (**XIII**) ... β^3 ... β (3142)(*Pub. L. O.* **II**) ... **Lv** (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...**Doolittle** (*Pub. Flower Obsy.* **I, II**) ...]

6327. **H 2627.** Nothing since H but this: 52 16

1901.14	132°.1	17″.77	2*n*	Espin	8.8...10.9

[**Espin** (*Mon. Not.* **LXII**, 532)...]

6328. **Hu 641.** With two later measures the mean is: 52 30

1903.86	189°.7	0″.39	3*n*	Hu	9.0...10.0

[**Hu** (*Bul. L. O.* No. 57)...]

6329. **Σ 1699.** Probably fixed. 52 54

1868.81	1°.8	1″.35	4*n*	Δ
1885.86	1.5	1.58	4*n*	Per
1895.37	2.7	1.19	2*n*	Coleman

[**Ma** (*F. S.* **I**) ... **Ma** (**XI**) ... **Se** ... **OΣ** (**IX**) ... Δ (1207) ... Δ (**I, II**) ... **Sp** (**II**) ... **Per**. .. **Per** (2748) ... **Maw** (**I**) ... **Glasenapp** (**II, IV**) ... **Giacomelli** (**II**) ... **Coleman** (*Mem. R. A. S.* **LIII**) ...]

6330. **Σ 1700.** Fixed. 52 54

1867.78	84°.9	7″.14	3*n*	Δ
1905.24	82.5	7.10	1*n*	β

[**Ma** (*F. S.* **I**)...**Ma** (**XI**)...Δ (**II**)...**WS**^{2}...β^6...]

6331. **Σ 1702.** No change since Struve. 52 56

1866.62	82°.8	35″.50	3*n*	Δ
1905.24	83.0	35.55	1*n*	β

[**Ma** (*F. S.* **II**)...Δ (**II**)...**Lau** (*Bul. Ast.* **XXII**, 238)...β^1...β^6...]

6332. **OΣ 258.** No change in fifty years. 52 58

1867.53	70°.2	10″.30	3*n*	Δ
1898.37	70.3	10.29	3*n*	Hu

[**OΣ** (**IX**)...Δ (**I**)...**Hu** (*Pub. L. O.* **V**)...]

6333. **Σ 1703.** A decided change from proper motion. A solution of the five positions cited gives for the most probable proper motion of A, 0″.082 in 295°.2. 53 7

1829.27	283°.1	22″.65	2*n*	Σ
1866.31	282.7	19.61	3*n*	Δ
1878.29	281.5	18.79	3*n*	β
1888.33	279.4	18.11	3*n*	Hl
1903.11	279.2	16.61	3*n*	β

[**Ma** (*F. S.* **I**) ... **Ma** (**XI**) ... **H** (**IV, V, VII**) ... **Flm**... Δ (1572) ... Δ (**II**) ... **Cin**^{5} ... β^1... **Hl** (**II**) ... **Do** (3930) ... β^6...]

$53^{m}\ 16^{s}$ **6334.** Σ 1701. No change.

1868.72	306°3	21″26	4*n*	Δ
1905.30	306.4	21.57	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^{5}...T (3185)...β^{6}...]

53 29 **6337.** 44 *Virginis.* Σ 1704. (= H IV. 51.) The principal star has a proper motion of 0″055 in 280°5 (Auwers).

1867.56	54°8	20″86	3*n*	Δ
1905.22	53.7	20.80	1*n*	β

[Ma (*F. S.* **II**)...Ma (**XII, XIII**)...H (**IV**)...Da^{3}...WS...Gl...Cin^{5}...Cin^{6}... En (2663)...β^{3}...Δ (**II**)...β^{6}...]

53 45 **6339.** Σ 1706 *rej.* Since Part I was in type, I have measured this pair:

1905.22	172°2	28″85	2*n*	β^{6}	8.0...10.5

54 25 **6342.** 46 *Virginis.* **A. G. Clark 5.** Discovered by Alvan G. Clark with the 12-inch now at Vienna. As yet no evidence of change. The faint star was added with the 18½-inch. The large star has a proper motion of 0″089 in 316°2 (Auwers), and the companion is evidently moving with it.

1877.61	149°5	1″25	5*n*	Δ	5.3... 8.1
1878.65	147.2	1.23	8*n*	Cin	6.5... 9.2
1879.10	151.5	1.44	4*n*	β	6.0...10.2
1879.48	152.1	1.32	2*n*	Sp	5.5... 8.2
1885.38	152.7	1.39	3*n*	Hl	
1889.35	151.2	1.26	3*n*	T	
1899.35	150.6	1.44	2*n*	A	

[Hl (2147)...Hl (**I, II**)...Δ (**I**)...Sp (**II**)...Cin^{5}... Cin^{6}...Wilson (Cin^{10})...β^{1} ...β^{3}...T (3186)...A (3639)...]

(See p. 1074)

54 32 **6343.** 37 *Comae.* **β 1081.** Discovered with the 36-inch. Auwers gives the proper motion of this star, 0″034 in 268°3. It is pretty certain now that the small star is moving with the other.

1898.52	348°7	5″24	2*n*	A
1901.42	343.0	5.26	1*n*	Lewis
1904.08	351.3	5.31	1*n*	A

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...A (3585)...Lewis (*Mon Not.* **LXII**, 383)...]

54 39 **6344.** **Hn 14.** The only later measures are:

1888.61	258°9	2″90	3*n*	Com	8.6...11.8

[β^{4}...Com (**VI**)...]

54 46 **6345.** **β 112.** Discovered with the 6-inch. There has been no sensible change. The proper motion of A is 0″312 in 287°7 (*A. G. Berlin*). This probably explains the change in the position of the double companion star. It should be remarked that some of the measures give the distance of A and B, and others the distance of A and BC, and, therefore, the measures as given are more accordant with the proper motion than would at first appear.

B and C

1892.14	293°7	1″86	3*n*	β
1892.32	291.1	1.90	3*n*	Lv
1897.81	293.4	2.12	4*n*	Doo
1898.28	292.9	2.12	3*n*	A
1902.32	293.8	1.92	1*n*	Lewis

A and BC

1892.13	348°9	150″70	2*n*	β
1897.45	349.2	151.18	4*n*	Doo
1898.28	348.9	151.05	3*n*	A

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3142) (*Pub. L. O.* **II**)...Δ (**I**)...WS^{2} ...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)... A (3585)...Doolittle (*Pub. Flower Obsy.* **I**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 503; **LXI**, 486; **LXIII**, 403)...]

6346. Σ 1705. (= S 644.) Fixed. The principal star is given a proper motion of 0″081 in 170°7 (*A. G. Berlin*). $54^{m}\ 49^{s}$

1867.60	187°7	26″86	3*n*	Δ
1905.16	188.5	26.79	1*n*	β

[Δ (**II**)...β^{1}...*A. G. Leipzig*, p. 209...β^{6}...]

6347. Σ 1707. Change is doubtful, taking all the measures into account. 55 17

1865.98	33°9	9″13	3*n*	Δ
1878.28	35.5	9.85	2*n*	β
1887.37	34.6	9.82	3*n*	Hl
1898.27	35.1	9.83	3*n*	Doo
1903.24	35.4	9.31	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1572)...Δ (**II**)...Flm...Pt...Hl (**II**)...β^{1}... Big...Doolittle (*Pub. Flower Obsy.* **I**)...Boeger (*A. J.* 522)...Do (3930)...]

6348. 78 *Ursae Majoris.* **β 1082.** Discovered with the 36-inch. The proper motion of 78 *Ursae* is 0″062 in 108°8 (*A. G. Hels.*), and the measures show that the small star is moving with it in space, with some relative motion. The following are all the measures: 55 35

1889.17	74°6	1″50	6*n*	β
1890.26	76.9	1.46	3*n*	β
1898.29	85.4	1.26	3*n*	Lewis
1898.51	86.5	1.42	3*n*	A
1899.04	88.6	1.29	1*n*	Bryant
1901.51	100.9	1.15	1*n*	Lewis
1902.79	93.7	1.41	4*n*	Doo

[β (**XV**)....β (2929, 2979, 3048) (*Pub. L. O.* **II**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 503; **LXII**, 383)....A (3585)....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)....]

6349. Σ 1708. No motion. 56 6

1866.68	295°7	11″19	3*n*	Δ
1905.42	295.7	11.08	1*n*	β

[H (**IV, V, VII**)...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{6}...]

56m 34s **6352.** **β 927.** Discovered with the 18½-inch. Probably unchanged.

1892.26	291°5	4″20	3*n*	β
1892.31	290.5	4.42	3*n*	Lv
1899.20	292.8	4.73	2*n*	β
1902.09	290.3	4.57	5*n*	Doo

[β (**XIII**)....β^{3}....β (3142) (*Pub. L. O.* **II**)....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)....Doolittle (*Pub. Flower Obsy.* **II**)....]

56 40 **6354.** **Σ 1709.** Without change. The stars have a common proper motion of 0″091 in 296°0 (*A. G. Berlin*).

1869.50	250°7	2″38	4*n*	Δ
1905.20	250.0	2.38	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...WS^{2}...Δ (**II**)...β^{6}...]

56 44 **6355.** **A. G. 183.** Double 2″–3″ in *A. G. Berlin.* Single, Miller (*A. J.* 546).

56 54 **6358.** **Σ 1711.** Change in distance?

1867.53	349°1	1″11	4*n*	Δ
1878.28	349.7	1.06	1*n*	β
1887.38	349.8	1.10	2*n*	Hl
1889.41	350.5	1.11	1*n*	HΣ
1899.33	348.3	0.77	2*n*	Bowyer
1903.33	347.4	0.93	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Flm...Δ (1474)...Δ (**II**)...Pt...Sk^{2}...WS^{2}...β^{1}...Hl (**II**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)...HΣ (**XII**)...]

56 57 **6360.** **Σ 1710.** No material change.

1867.24	262°2	2″47	3*n*	Δ
1905.16	260.1	2.42	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^{5}...*A. G. Leipzig*, p. 209...β^{6}...]

57 9 **6361.** **A. G. 184.** "Double" in *A. G. Berlin.* Single, Miller (*A. J.* 546).

57 10 **6362.** **β 928.** Discovered with the 18½-inch. No relative motion.

1888.70	312°5	1″98	3*n*	Lv
1892.25	312.8	2.01	3*n*	β
1893.37	313.8	2.01	2*n*	Jones
1901.83	314.3	2.14	3*n*	Doo

[β (**XIII**)....β^{3}....β (3142) (*Pub. L. O.* **II**)....Collins and Jones (*A. J.* 378, 312) (*Proc. Haverford Coll. Obsy.* 1892)...Ra (**XLVII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

57 20 **6363.** *Hydrae* 348. **β 341.** Discovered with the 6-inch. Change is doubtful. This a naked-eye star; Gould 5.9m (*Virgo*). Lalande 24275. Some of the later measures are:

1881.38	312°9	0″62	3*n*	Sp
1881.46	313.4	0.71	2*n*	β
1889.26	306.8	0.66	1*n*	Sp
1896.54	307.9	0.78	2*n*	A
1898.26	315.5	0.66	3*n*	A

[β (**VI**)...β (2062)...β^{4}...Δ (**I**)...Cin^{3}...Cin^{4}...Cin^{5}...Wilson (Cin^{10})...Sp (**II, III**)...Sellors (3303)...A (3395, 3585)...]

6364. **Kr 41.** Noted "double" in *A. G. Hels.* No change. 57m 32s

1898.36	334°8	3″65	4*n*	Doo

[β (3042) (*Pub. L. O.* **II**)...Espin (3717)...Doolittle (*Pub. Flower Obsy.* **I**)...]

6366. **Σ 1713** *rej.* From *Catalogus Novus.* Nothing since Struve but the following: 57 41

1905.16	281°3	23″18	1*n*	β^{6}	8.0...8.8

6367. 48 *Virginis.* **β 929.** Discovered with the 18½-inch. There may be some retrograde motion, but it is very slow. The components have a common proper motion, and it is therefore a physical system. The proper motion from Auwers is 0″091 in the direction of 258°7. Some of the later measures are the following: 57 43

1881.46	223°6	0″48	3*n*	β
1885.86	222.2	0.38	6*n*	En
1887.54	222.7	0.36	2*n*	Sp
1888.25	219.1	0.54	5*n*	T
1888.32	220.1	0.64	2*n*	Lv
1889.33	217.1	0.66	5*n*	T
1891.26	221.2	0.50	3*n*	β
1897.32	220.8	0.67	3*n*	A
1899.35	219.2	0.58	2*n*	A
1901.31	223.8	0.61	3*n*	Doo
1903.39	216.8	0.61	2*n*	Biesbroeck
1905.34	219.9	0.61	3*n*	Doo

[β (**XIII**)...β^{3}...β^{4}...β (3114) (*Pub. L. O.* **II**)...Cin^{5}...Cin^{6}...En (2786)...Lv^{1}...Lv (*Sid. Mess.* **VIII**, 77)...T (2991, 3186)...Sp (**III**)...Big...A (3465, 3639)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 503; **LXI**, 486; **LXII**, 383; **LXIV**, 798)....Coleman (*Mem. R. A. S.* **LIV**)....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...Biesbroeck...]

6368. **Σ 1712.** Probably without change. 57 46

1867.95	333°4	8″48	3*n*	Δ
1903.40	332.7	8.20	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...Δ (**II**)...Gl...WS...WS^{2}...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Peters (2676)...Romberg (2689)...Cogshall (4022)...]

6369. **Σ 1714.** Unchanged. 57 49

1870.03	308°6	3″14	4*n*	Δ
1902.71	308.3	2.52	4*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cogshall (*A. J.* 546)...]

6371. **Σ 1715.** (= **H 525.**) There may be some change in the distance. 58 9

1867.88	230°7	7″39	3*n*	Δ
1879.30	229.6	7.40	1*n*	Cin
1896.48	229.1	7.26	3*n*	A
1902.38	232.2	7.64	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^{5}...A (3395)...]

6372. **H 1226.** The only observation since H is: 58 14

1880.37	191°3	13″29	1*n*	Big	10...10.2

(See p. 1074)

$58^m\ 28^s$ **6373.** **Σ 1716.** *Virginis* 427. Probably unchanged.

1848.35	145°8	2″46	2*n*	Ma
1851.80	146.2	2.49	2*n*	Ma
1867.64	146.4	2.61	3*n*	Δ
1889.30	144.3	2.61	2*n*	T

[Ma (*F. S.* **I**) .... Ma (**XI, XII, XIII, XV**) .... WS .... WS² .... Gl .... Δ (**II**) .... T (3185) ....]

58 40 **6374.** **β 798.** Discovered with the 15½-inch at the Washburn Observatory. The only later observation is the following:

1892.40	172°6	0″44	2*n*	β

[β (**XII**) .... β⁴ ... β (3142) (*Pub. L. O.* **II**) ...]

58 48 **6376.** **Σ 1720.** No motion.

1867.94	334°5	1″59	3*n*	Δ
1879.33	334.7	1.58	1*n*	β

[Ma (*F. S.* **I**) ... Δ (**II**) ... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Cin⁵ ... β³ ...]

59 34 **6379.** **H 220.** (= **Ho 539.**) H (VI) 41°7 : 15″± : 7...14 (1831+); "former distance much underrated."

1896.70	42°5	17″38	3*n*	Ho	7.5...11.8
1905.16	42.4	17.75	1*n*	β	

[Ho (3557) ... β⁶ ...]

59 54 **6380.** **Espin 125.** The only later measures are:

1903.49	122°7	2″40	3*n*	Biesbroeck

[Espin (*Mon. Not.* **LXIII**, 172) ... Biesbroeck ...]

0 4 **6381.** **Ho 257.** (= **Ku 44.**) No motion.

1901.46	155°8	2″09	2*n*	Kustner
1903.31	154.9	1.80	2*n*	A

[Ho (2977, 3234) ... Kustner (3821) ...]

0 14 **6382.** **H 2637.** These stars appear to be SD (20°) 3775 and 3776; magnitudes 9.0...9.1.

0 14 **6383.** **Hu 643.** (AC = **Σ 1718.**) The principal component of Σ 1718 was found by Hussey in 1904 to be a close pair. This star has a proper motion of 0″084 in 90° (*A. G. Harvard*). There is no change in the Struve companion.

1867.87	272°9	12″85	4*n*	Δ
1901.37	272.1	13.21	2*n*	Espin

[Ma (*F. S.* **I**) .... H (**V**) .... Seagrave (*Sid. Mess.* **II**, 274) .... Δ (**II**) .... Cin⁵ .... Espin (*Mon. Not.* **LXII**, 529) ... Hu (*Bul. L. O.* No. 57) ...]

0 24 **6384.** **Hu 739.** With a later measure the mean is:

1903.82	32°9	0″86	2*n*	Hu	8.8...13.5

[Hu (*Bul. L. O.* No. 65) ...]

6385. **β 1083.** (AC = **H 2638.**) The duplicity of Herschel's nearest companion was discovered with the 36-inch. This is a naked-eye star in *Coma Berenices*. It is probable that B and D are only optical companions. There is a faint nebula in the field (Dreyer 4966), 149″1 distant, in the direction of 36°1. $0^m\ 27^s$

On one occasion a very faint star was suspected about 2″ from A, but this has not been verified. The following are all the later measures of the close pair:

B and C

1897.38	243°6	0″42	1*n*	Lewis
1898.30	234.7	0.40	1*n*	Lewis
1898.31	226.6	0.38	2*n*	β
1898.52	238.2	0.47	2*n*	A
1899.38	225.0	0.58	1*n*	Lewis
1901.42	221.3	0.35	1*n*	Lewis

A and BC (= H 2638)

1878.42	218°9	6″54	1*n*	β
1889.11	219.9	6.23	3*n*	β
1898.03	219.1	6.35	3*n*	Lewis
1898.31	218.4	6.25	2*n*	β
1898.52	219.1	6.40	[illegible]	A
1898.94	217.8	6.16	1*n*	Barnard
1901.33	219.1	6.24	3*n*	Doo

A and D

1878.42	7°2	40″28	1*n*	β	
1898.31	9.5	39.24	2*n*	β	...10.8
1898.52	8.8	39.34	2*n*	A	...12.5
1901.33	9.3	39.64	3*n*	Doo	

[β (**XV**) ... β (2929) ... β¹ ... β (*Pub. L. O.* **II**) ... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 503; **LXII**, 383) ... A (3585) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

6386. **β 930.** **B. A. C.** 4389. Discovered with the 6-inch. A naked-eye star in *Canes Venatici*. 0 28

1891.24	113°3	2″67	3*n*	β
1898.43	116.7	2.75	1*n*	Lewis
1899.29	116.0	2.70	1*n*	β
1901.40	119.5	2.90	3*n*	Doo

[β (**XIII**) ... β³ ... β (3114) (*Pub. L. O.* **II**) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXII**, 383) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

6388. **Lewis 12.** Place approximate. Not identified in DM. 1 .

1901.42	202°9	0″42	1*n*	Lewis

[Lewis (*Mon. Not.* **LX**, 503; **LXI**, 486; **LXII**, 390) ...]

6389. **β 799.** Discovered with the 15-inch at the Washburn Observatory. A naked-eye star in *Draco*. Change in angle is probable. The following are all the other measures: 1 7

1881.34	238°7	0″57	5*n*	β
1885.61	238.3	0.57	1*n*	HΣ
1888.63	244.4	0.65	3*n*	Com
1891.30	245.3	0.71	3*n*	β
1896.71	245.3	0.83	3*n*	A
1901.37	248.1	0.76	3*n*	Doo

[β (**XII**) ... β⁴ ... β (3114) (*Pub. L. O.* **II**) ... Com (*Pub. Washburn Obsy.* **VI**) ... A (3395) .. HΣ (**XII**) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

(See p. 1075)

1m 13s **6390.** **Σ 1719.** (= **S 645.**) Without change.

1866.24	3°6	7″17	3*n*	Δ
1889.39	2.6	6.96	4*n*	Giacomelli

The stars have a common proper motion:

Boss	0″168 in 214°8
Bossert	0.167 in 218.9

[Ma (*F. S.* **I**)...Ma (**XI**)...H¹...Wr...Se...Ra (**XXIII**)...Ba (**IV**)...Δ (1207) ...Δ (**I, II**)...Glasenapp (**I, III**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

1 24 **6391.** **Comstock.** From *Pub. Washburn Obsy.* VI.

1898.3	183°1	2″96	1*n*	See
1905.20	180.1	3.46	3*n*	Doo

[Com (**VI**)...Innes (*Southern Double Stars*, p. 312)...]

1 36 **6392.** **H 2640.** Stars a little fainter (1877). In DM, A is 8.7 m.

1905.09	3°9	51″20	1*n*	β⁶	9.3...9.7

1 54 **6393.** **OΣ 259** *rej.* Excluded for distance in second edition of *Poulkowa Catalogue.* Unchanged. The principal star is given a proper motion of 0″356 in 293°2 (*A. G. Berlin*).

1898.25	21°3	39″36	3*n*	Hu

[Ma (**XI**)...Ba (**I**)...Δ (**I**)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

2 17 **6394.** **A. G. 185.** "Duplex?" in *A. G. Berlin.* Single, Miller (*A. J.* 546).

2 18 **6395.** **OΣ 260.** On the whole the measures do not show any motion.

1843.30	120°0	0″75	2*n*	Ma
1870.70	114.4	0.77	7*n*	Δ
1885.42	119.8	0.84	4*n*	Per
1887.38	121.4	0.58	4*n*	Hl
1895.42	124.7	0.58	4*n*	Gla
1898.16	122.8	0.62	3*n*	Hu
1903.35	120.3	0.57	3*n*	Bowyer

[Ma (**XI, XIII**)....OΣ (**IX**)....Flm....Δ (**I**)....Per....Per (2749)....Hl (**II**).... Glasenapp (**II, IV**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)...Brown (3645)....Hu (*Pub. L. O.* **V**)..]

2 19 **6396.** **S 647.** Both stars in Schjellerup's catalogue; the smaller 9.3 m. Probably unchanged.

1879.39	213°4	41″78	2*n*	Cin	8.0...10.0
1890.43	212.2	41.86	2*n*	Gla	7.1... 8.6

[Cin⁵...Glasenapp (**I**)...]

2m 25s **6397.** **Σ 1721.** "Duplex" in W¹. Unchanged.

1867.95	358°3	6″06	3*n*	Δ
1893.32	359.1	6.44	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**I**)...Cin⁵...Glasenapp (**II**)...]

2 30 **6398.** **Σ 1722.** *Comae* 179. (= **S 646.**) Later observers make the angle less, but do not show any motion.

1867.67	338°4	3″15	3*n*	Δ
1882.43	338.9	3.33	2*n*	Sp
1885.37	338.6	3.29	3*n*	Per
1887.37	338.9	3.19	3*n*	Hl
1903.31	336.8	3.10	2*n*	Biesbroeck

[Ma (*F. S.* **II**)...Ma (**XI**)...H¹...En (1674)...OΣ (**IX**)...Δ (**II**)...Se...Se²... WS...WS²...Gl...Sk²...Per...Per (2748)...Sp (**II**)...Flm...Pt...Do (2198, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Hl (**II**)...Big...Big (*Bul. Ast.* **XII**, 299)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Boeger (*A. J.* 522)... Biesbroeck...]

2 43 **6400.** **Σ 1723.** (= **H 526.**) Fixed.

1865.96	7°6	6″60	3*n*	Δ
1885.35	8.0	6.80	2*n*	Per

[Ma (*F. S.* **I**)...Ma (**XI**)...Du...Δ (**II**)...Per...Per (2748)...]

3 19 **6404.** **Hu 572.** No other complete measures.

[Hu (*Bul. L. O.* No. 27)...Lewis (*Mon. Not.* **LXIV**, 798)...

3 44 **6405.** *θ Virginis.* **Σ 1724.** (= **H III. 50** = **H VI. 43** = **Sh 160.**) Fixed. The principal star has a proper motion of 0″074 in **240°1** (Auwers), and the companion is moving with it.

1868.30	343°1	7″10	4*n*	Δ
1880.32	344.6	7.17	2*n*	β
1905.34	343.7	6.78	2*n*	β

The distant star is not in Struve.

1868.39	297°6	70″52	1*n*	Δ	...10.0
1880.32	297.1	70.87	2*n*	β	... 9.0
1890.42	298.5	71.79	3*n*	Gla	
1905.34	298.6	71.06	2*n*	β	

[Ma (*F. S.* **I**)....Ma (**XI, XIII, XV**)...H¹...Da¹...Da²...Wr...H (**II, IV, V**) ...Se...Se³...Ba (**II**)...Ra (**XXII, XXXIX**)...Gl...WS...Sp (**II**)...Δ (**II**) ...En (2663)...Cin⁵...Pk...β³...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...Doolittle (*Pub. Flower Obsy.* **II**)...β⁶...]

4 10 **6406.** 42 *Comae.* **Σ 1728.** A very interesting binary, with the shortest period of all the Struve stars. The plane of the orbit is nearly in the line of sight, so that the angle is practically constant at about 190°, the two stars making an occultation at intervals of about 13 years. The period is as accurately known as that of any known binary. Two orbits have been found:

1874	O. Struve	25.71	*Mon. Not.* XXXV, 367
1895	See	25.56	*Evolution of the Stellar Systems*

The proper motion of the system is:

Auwers	0″.487 in 287°.5
Porter	0.468 in 288.7

A distant star, 11 m, has been observed by OΣ for the better determination of the proper motion of the binary:

1851.34	321°.7	135″.44	3*n*	OΣ
1884.34	325.7	123.78	2*n*	HΣ
1904.35	328.2	116.60	3*n*	β

The measures of OΣ and β give 0″.446 in 287°.7 for the proper motion of AB.

The following are some of the recent positions of the close pair:

1899.36	9°.7	0″.22	4*n*	A
1901.26	10.0	0.30	3*n*	A
1903.31	10.0	0.68	8*n*	Doo
1903.32	12.6	0.58	6*n*	Biesbroeck
1903.42	10.4	0.43	2*n*	A
1904.96	13.4	0.65	1*n*	A

[Ma (430, 452) ... Ma (**IX, X, XI, XIII, XV**) ... Σ^1 ... Ma (*F. S.* **I**) ... H (**V**) ... Ek (**I**) ... Da^3 ... Da^4 ... Bp ... Wr ... Se (1614) ... Se (*Comp. Rend.* **XLVIII**, 375) ... Se ... Se^2 ... Se^3 ... Wn (**V**) ... Wn (1738) ... En (1674, 2663) ... Du ... OΣ (*Bul. de Acad. Sci. St. Petersburg* **III, V**) ... OΣ (*Mon. Not.* **XXXV**, 367) orbit ... OΣ (**IX**) (**X**, pp. 90, 168) ... Δ (1474, 1735, 1886, 2079, 2193) ... Δ (**II**) ... Ba (**II**) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2433, 3023, 3930) ... Hd ... Flm ... Sp (2133) ... Sp (**I, II**) ... Sp (**II**, App.) ... Perry (*Ast. Reg.* **XIX**, 176) (*Eng. Mech.* **XXXVIII**, 192) ... WS ... WS^2 ... Sk ... Sk^2 ... Hl (*Wash. Obsns.* 1880–86) ... Hl (2147) ... Hl (**I, II**) ... Je (2351, 2449) ... Per ... Per (2529, 2748) ... Kustner (2584) ... Lv^1 ... Lv (*A. J.* 278) ... *Proc. Haverford Coll. Obsy.* 1892 ... Big ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798) ... β^3 ... β^4 ... β (3048) (*Pub. L. O.* **II**) ... Sp (**III**) ... Big (*Bul. Ast.* **XII**, 299) ... Everett (*Mon. Not.* **LVI**, 464) ... See (*A. J.* 349, 378) (*Mon. Not.* **LVI**, 511) ... Com (*Pub. Washburn Obsy.* **X**) ... Hu (*A. J.* 427) ... Knorre (3518) ... A (3585, 3639) (*Bul. L. O.* No. 11) ... Brown (3645) ... Doolittle (*Pub. Flower Obsy.* **I, II**) (*A. J.* 547) .... HΣ (**XII**) .... Sk^5 .... Biesbroeck ... β^6 ...]

(See p. 1075)

$4^{m}\ 12^{s}$ **6407.** **Σ** 1727. (= **H** 527.) Fixed.

1868.95	335°.3	7″.41	4*n*	Δ
1902.85	334.8	7.60	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ... β^1 ...]

4 30 **6409.** **β** 609. Discovered with the 18½-inch. Probably unchanged.

1889.31	349°.1	0″.91	3*n*	β	6.8...9.8
1901.83	359.1	0.81	3*n*	Doo	

[β (**X**) ... β^1 ... β (2930) (*Pub. L. O.* **II**) ... Cin^5 ... Cin^6 ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

4 33 **6410.** 17 *Canum Ven.* **β** 608. (AC = **Σ 24 App. I.**) The close star was discovered with the 18½-inch. C is 15 *Canum Ven.* Auwers gives the proper motions of the large stars:

A = 0″.107 in 295°.5
C = 0.029 in 284.1

It is evident that the new star has the same proper motion as A. All the other measures of this are given.

A and B

1885.54	272°.4	1″.36	2*n*	HΣ
1889.51	285.0	1.04	1*n*	Sp
1899.08	284.7	1.12	1*n*	β
1901.34	280.4	1.20	3*n*	Doo

A and C (= Σ 24 App. I)

1867.71	297°.3	287″.92	6*n*	Δ
1877.42	297.3	288.25	4*n*	Je
1898.43	297.2	285.57	2*n*	Gla

[β (**X**) .... β^1 .... Sp (**III**) .... Δ (**II**) .... Δ (1574) .... Je (2338) .... Ra (**XXVI**) .... Se^1 ... Maiebckato (*Measures*, 1892) ... HΣ (**XII**) ... Glasenapp (**V**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

6411. *Virginis* 454. **β** 931. Discovered with the 18½-inch. No material change. Lalande 24489. $4^{m}\ 51^{s}$

1883.44	204°.0	4″.71	3*n*	Ho
1898.20	200.4	5.23	3*n*	Doo
1898.32	202.6	5.02	3*n*	A

[β (**XIII**) .... β^3 .... J. J. M. Perry (*Eng. Mech.* **XXXVIII**, 192) .... Ho (2978) .... Doolittle (*Pub. Flower Obsy.* **I**) ... A (3585) ...]

6412. **OΣ (App)** 121. The later measures are: 5 12

1883.36	9°.2	106″.66	4*n*	Franz
1905.11	9.2	107.87	1*n*	β

[Δ (**I**) ... Franz (2649) ... β^6 ...]

(See p. 1075)

6413. **Σ** 1729. No motion. 5 33

1868.49	274°.1	8″.22	4*n*	Δ
1902.23	273.8	8.38	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ...]

(See p. 1075)

6414. 53 *Virginis.* **H** 2645. "Position by diagram." The principal star has a proper motion of 0″.285 in the direction of 168°.6 (Auwers). There are no early measures. 5 40

1878.74	9°.6	70″.91	2*n*	β	...12.5
1901.32	7.3	77.09	3*n*	β	

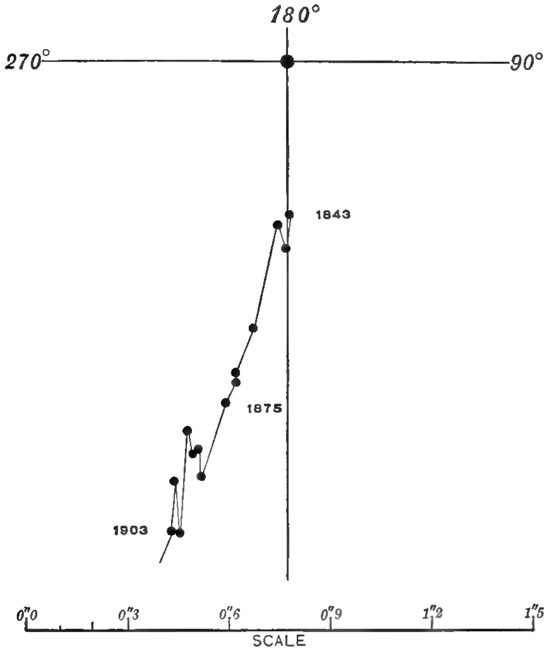
Doolittle measures a more distant star, 354°.5 : 184″.22 (1897.41) 3*n*.

[β^1 ... β^3 ... β (*Ast. Reg.* **XVI**, 130) ... Doolittle (*Pub. Flower Obsy.* **I**) ... β^5 ...]

6415. **OΣ** 261. The distance has been increasing, and the motion is practically rectilinear. This may be a system like 42 *Comae* (No. 6406), the plane of the orbit being nearly in the line of sight. The companion may have reached the point of maximum distance. 6 23

1843.32	360°.4	0″.52	2*n*	Ma
1843.80	359.2	0.63	2*n*	OΣ
1847.17	356.5	0.55	4*n*	OΣ
1857.76	352.6	0.91	3*n*	OΣ
1866.86	350.4	1.08	2*n*	OΣ
1870.03	350.8	1.09	8*n*	Δ

1875.35	349°6	1″16	4*n*	Sp
1884.38	348.2	1.41	3*n*	Per
1887.39	347.0	1.33	3*n*	Hl
1889.47	346.3	1.35	7*n*	HΣ
1893.39	345.0	1.28	2*n*	Ho
1896.48	347.2	1.61	3*n*	A
1899.29	344.9	1.45	1*n*	β
1903.23	345.7	1.67	2*n*	Do
1903.39	345.3	1.56	2*n*	Biesbroeck
1903.42	347.9	1.62	3*n*	Bowyer



OΣ 261

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Flm ... Pl. . Du ... Δ (**I**) ... WS^2... Sp (2133) ... Sp (**II**) ... Per ... Per (2685) ... T (2899) ... En (2678) ... Do (3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Hl (**II**) ... Ho (2978, 3234) ... Maw (**I, IV**) ... Jones (*A. J.* 312) ... Glasenapp (**II**) ... Je (2449) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... A (3395) ... Glasenapp (**IV**) ... Lv (*A. J.* 407) ... Brown (3645) ... Knorre (3518) ... Coleman (*Mem. R. A. S.* **LIII**) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ... Boeger (*A. J.* 522) ... Doolittle (*Pub. Flower Obsy.* **II**) ... β^5 ... Biesbroeck ...]

$6^m\ 24^s$ **6416.** **Howe 27.** Discovered at Cincinnati. Both stars observed in the *Argentine General Catalogue.*

1897.46	289°4	2″89	1*n*	See
1905.21	294.8	2.85	4*n*	Doo

[Cin^1 ... Cin^4 ... Wilson (Cin^{10}) ... See (3496) ...]

6 32 **6417.** **Σ 1730.** Unchanged.

1868.18	339°3	1″98	4*n*	Δ
1889.14	337.0	1.80	3*n*	HΣ

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... Δ (**II**) ... Cin^5 ... HΣ (**XII**) ...]

6418. **Hu 573.** The only other measures are: $6^m\ 42^s$

1903.41	174°6	2″38	2*n*	Lewis

[Hu (*Bul. L. O.* No. 27) ... Lewis (*Mon. Not.* **LXIV**, 798) ...]

6420. **OΣ 262.** (= **H 2646.**) Fixed. 6 51

1867.86	182°3	27″95	4*n*	Δ
1898.34	182.0	28.02	3*n*	Hu

[OΣ (**IX**) ... Δ (**I**) ... Per ... Per (2749) ... T (2991) ... Hu (*Pub. L. O.* **V**) ...]

6421. **β 221.** Discovered with the 6-inch. No motion. 6 54

1880.36	46°4	1″52	2*n*	Cin
1896.49	45.6	1.34	3*n*	A
1901.24	48.9	1.62	3*n*	Doo

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Δ (**I**) ... Cin^5 ... Cin^6 ... LM ... A (3395) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ...]

6422. 54 *Virginis.* **Sh 161.** (= **H** II. 45 = σ 433.) Unchanged. (See No. 6433.) The proper motion of 54 *Virginis* is 0″084 in 266°6 (Auwers). 7 3

1867.30	35°5	5″17	3*n*	Δ
1889.30	34.5	5.23	2*n*	T

[Ra (**XXII**) ... Δ (**I**, p. 355) ... Cin^3 ... Cin^4 ... Cin^6 ... Wilson (Cin^{10}) ... Glasenapp (**I**) ... T (3186) ... Scott (*Brit. Ast. Ass'n* **VIII**, 66) called β 342 ...]

6423. **Σ 1731.** Unchanged. 7 5

1867.85	301°9	8″91	3*n*	Δ
1905.05	299.8	8.85	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

6425. **S 648.** "A nebula in the lower part of the field." This appears to be *Dreyer* 5053. B is W^2 XIII. 96. The only observations since 1825 are the following: 7 16

1898.17	65°9	87″25	3*n*	Doo	8 ... 8
1905.10	66.1	87.26	2*n*	β	

[Doolittle (*Pub. Flower Obsy.* **I**) ... β^6 ...]

6426. **Σ 1732.** There is no sensible change in the Struve companion: 7 50

1867.86	127°3	26″30	4*n*	Δ
1905.08	127.0	26.03	2*n*	β

The 40-inch shows a close companion to B, not heretofore seen:

BC	1905.05	291°2	2″57	1*n*	β	... 13.5

[H (**V**) ... Ma (*F. S.* **II**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

6427. **O. Stone 28.** Discovered at the Cincinnati Observatory. 7 57

1885.23	334°7	12″42	1*n*	Wilson

[β^3 ... Cin^5 ... Cin^6 ... Wilson (Cin^{10}) ...]

8m 1s **6428.** **Ho** 55. Ho gives the angle, 190°.2 (1886.52).

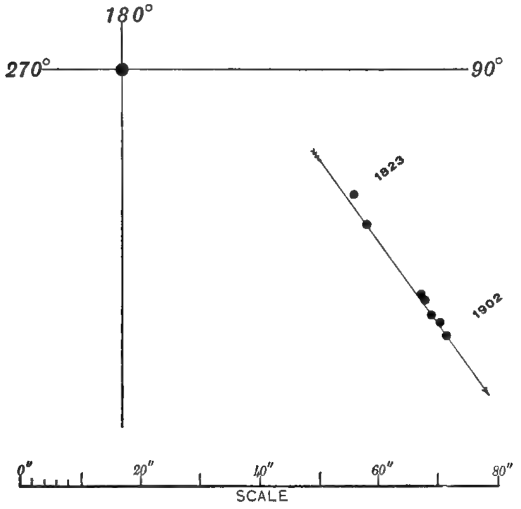
[Ho (2778, 3558)...] (See p. 1075)

8 32 **6430.** **H** 2647. Another observation, 208°.0 : 25″±: 5–6...13 (1830+). In Heis and Arg. 6 m.

1905.08 211°.1 47″.53 2*n* β^6 6.7...11.7

8 39 **6431.** **Sh** 162. (= σ 434.) The principal star has a large proper motion:

Porter	0″.388 in 219°.4
Kustner	0.395 in 216.9



Sh 162

The measures of the companion, 1840 and 1902, give for this movement of A, 0″.372 in 215°.5. These stars are Lalande 24582 and 24584.

1823.34	61°.7	44″.85	1*n*	Sh	
1840.34	57.6	49.37	1*n*	OΣ	7.5...8.5
1879.34	52.9	63.69	3*n*	Doubiago	
1881.37	52.5	64.60	3*n*	β	7.0...8.0
1890.40	51.4	67.22	2*n*	Gla	6.9...7.2
1894.30	51.4	68.93	2*n*	Eng	
1902.18	50.6	71.22	2*n*	β	

[H (**VIII**)...Ra (**XXXIX**)...OΣ (X)...β^4...Glasenapp (I)...Engelhardt (**III**)...β^5...]

8 42 **6432.** **OΣ (App)** 122. B is Rad^1. 2981. The proper motion of A is 0″.139 in 105°.9 (*Gr. 10-Year Catalogue*). The only later measures are:

1903.09 211°.6 116″.06 3*n* β 7.5...8.3

[Δ (I)...β^6...]

6433. **β** 342. Discovered with the 6-inch. In SD 8.2 m. Probably unchanged. 54 *Virginis* (= Sh 151) is 1m 46s *p* and 6′ *n*. These two pairs are curiously similar in all respects except brightness. They have practically the same position-angle, the same relative magnitudes, and differ in distance only a little more than 1″. Some of the measures credited to this pair belong to 54 *Virginis*. 8m 49s

1878.84	34°.9	3″.98	2*n*	Cin
1880.38	33.8	3.96	4*n*	Cin
1881.38	33.8	5.32	3*n*	Sp
1888.32	34.2	3.80	2*n*	Lv
1893.37	33.0	4.84	2*n*	J
1898.37	34.8	3.95	3*n*	A
1899.09	37.2	4.00	1*n*	β
1903.46	33.8	3.96	3*n*	Scott

[β (**VI**)....β (2062)....Δ (I)....Cin^4....Cin^5....Cin^6....Sp (**II, III**)....Wilson (Cin^{10})...Lv^1...Jones (*A. J.* 312)...Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon Not.* **LXIV**, 54)...A (3585)...]

6434. **Σ 25 App. I.** *Draconis* 34 and 35. B and C are Rad^1. 2983 and 2984. The principal stars appear to have nearly the same proper motion. 9 23

A = 0″.157 in 274°.4 Schroeter
B = 0.148 in 270 Schroeter

A and B

1867.81	296°.5	178″.80	6*n*	Δ
1877.57	296.4	179.42	3*n*	Je
1891.58	296.3	178.51	3*n*	Mai

A and C

1867.81	231°.9	120″.90	6*n*	Δ
1877.57	231.2	119.49	3*n*	Je
1891.53	230.3	117.69	2*n*	Mai

[Ra (**XXVI**)...Se...Δ (**II**)...Je (2340)...Δ (1574)...Maiebckato (*Obsns.* 1892). *Mon. Not.* **LI**, 398...]

6435. **H** 528. The only measures are: 9 29

1903.17 181°.4 19″.05 2*n* β^6 9.5...11.3

6437. **See** 174. Not double in 1900, Cogshall. 10 15

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

6438. **Σ** 1733. (= **H̱ II.** 46.) Fixed. (See No. 6440.) 10 27

1867.63	124°.5	4″.84	3*n*	Δ
1890.33	126.1	4.80	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Δ (**II**)... Cin^5... β (3048) (*Pub. L. O.* **II**)... Com (**X**)...Glasenapp (**IV**)... Lewis (*Mon. Not.* **LIX**, 400; **LXIII**, 403)...]

6439. **H** 2648. This star has a proper motion of 0″.048 in 245°.5 (Battermann). (See p. 1075) 10 38

$10^m\ 42^s$ **6440.** **H II. 46.** This is identical with Σ 1733. There is a bright star in the *nf* quadrant of that pair which is probably C of H. As there has been no change in AB, his angle must be in error.

10 47 **6441.** **A. G. 186.** Double in *A. G. Albany*. Measures by Miller (*A. J.* 554).

10 52 **6442.** **β 800.** *Comae* 201. Discovered with the 15½-inch at the Washburn Observatory. The change so far has been principally in distance, indicating that the plane of the orbit is nearly in the line of sight. The system has a large proper motion, according to Krueger, of 0″697 in the direction of 113°6. Lalande 24652.

1881.36	121°5	1″27	4*n*	β
1886.34	118.9	1.94	2*n*	HΣ
1889.12	117.1	2.17	4*n*	Com
1890.79	115.2	2.12	6*n*	β
1892.60	117.8	2.12	5*n*	Sp
1896.19	114.1	2.52	5*n*	Com
1898.14	110.1	2.88	3*n*	Doo
1898.32	111.9	2.57	3*n*	A
1898.39	117.0	2.53	3*n*	Lewis
1898.54	116.4	2.54	1*n*	β
1900.12	117.6	2.60	5*n*	Lewis
1900.47	113.6	2.61	2*n*	A
1901.34	113.2	2.76	3*n*	Doo
1902.84	112.3	2.69	4*n*	Lewis
1903.43	115.2	2.90	3*n*	Biesbroeck
1905.33	108.7	2.86	4*n*	Doo
1905.41	113.5	2.91	2*n*	β

[β (**XII**)....β[4]....β (*Sid. Mess.* **IX**, 299)....β (3048, 3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**).... Com (*Pub. Washburn Obsy.* **VI**, **X**)(*Sid. Mess.* **IX**, 78).... Sp (**III**).... HΣ (**XII**).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)....A (3585)(*Bul. L. O.* No. 11)....Brown (3645)....Do (3930).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I**, **II**).... Biesbroeck....]

10 55 **6443.** **β 222.** (= **Hd** 136.) Discovered with the 6-inch, but it had been previously seen by the Harvard observers, and is included in a list of new stars first published in 1882. The components seem to be fixed.

1894.44	14°7	1″50	2*n*	Sellors
1896.48	14.8	1.51	3*n*	A
1905.11	13.1	1.87	3*n*	Doo

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Cin[4]...Hd...Sellors (3303)...A (3395)... Doolittle (*Pub. Flower. Obsy* **II**)...]

11 32 **6446.** **OΣ 263** Fixed. The measure in Ma (XIII) obviously belongs to some other pair.

1868.61	133°2	2″13	4*n*	Δ
1898.27	132.8	2.10	3*n*	Hu

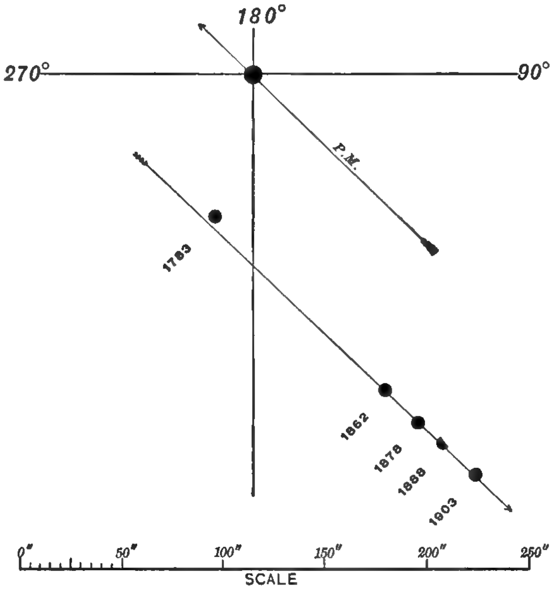
[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Per...Per (2749)... Glasenapp (**V**)... Hu (*Pub. L. O.* **V**)...]

6447. 61 *Virginis.* **H VI. 90.** (= σ 436.) The change is due to the proper motion of A, which is given from meridian positions: $12^m\ 8^s$

Auwers	1″515 in 225°9
Porter	1.513 in 225.7

The following are all the later measures:

1862.29	22°6	169″29	1*n*	Kn
1878.35	25.3	190.69	2*n*	β
1888.34	27.1	204.96	3*n*	Hl
1903.20	28.8	225.91	3*n*	β



61 Virginis

The four sets of measures give for the most probable value of the proper motion of A:

1″481 in 226°6

[Kn...Flm...β[1]...β[3]...Hl (**II**)...Glasenapp (**I**)...β[6]...]

6448. **W. Upton 2.** No star in this place in Cord. DM. If it is Cord. DM (25°) 9726 (8.9) the Decl. given here is 5′ too small. 12 35

1885.32	201°1	17″22	1*n*	Wilson

[Cin[5]...Wilson (Cin[10])...]

6449. **H 222.** Place and description from H (V). Not in W[1]; about 9 m (1877). (See p. 1075) 13 4

6450. **Hu 740.** With a later measure the mean is: 13 24

1903.18	272°5	3″92	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

$13^m\ 29^s$ **6451.** **H 2649.** These are all the observations:

1880.32	344°4	23″48	2*n*	Big	9...9
1900.36	342.9	22.79	2*n*	Espin	9...9.3

[Big...Espin (3717)...]

(See p. 1075)

13 59 **6452.** **H 529.** The principal star has a large proper motion:

Porter	0″900 in 154°6
Kustner	0.874 in 154.9

The companion has the same motion. The following are all the observations since Herschel:

1896.51	120°4	17″30	3*n*	A	
1898.28	119.5	17.40	4*n*	Doo	
1898.86	121.0	17.56	2*n*	A	9.0...10.0
1902.32	121.5	17.00	2*n*	A	
1902.57	120.5	17.18	2*n*	β	9.3...11.0

In his search for parallax, Ball connects this with the 6.7 m star, DM (35°) 2435. The meridian positions and direct measures give:

1825	256°1	296″01		Weisse
1879.70	264.4	311.46	2*n*	Bl
1902.14	267.8	318.98	1*n*	β

[Bl (**V**)...A (3395, 3585)...Doolittle (*Pub. Flower Obsy.* I)...β^6...]

14 34 **6454.** **Hu 644.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

14 36 **6455.** **Σ 1734.** Very slow retrograde motion in angle, with little or no change in distance.

1830.35	198°1	0″73	4*n*	Σ
1847.16	204.0	0.97	5*n*	OΣ
1865.47	192.2	1.01	3*n*	Δ
1875.37	193.2	1.25	3*n*	Sp
1887.38	191.6	1.02	3*n*	Hl
1889.07	190.8	1.33	3*n*	Maw
1893.46	195.0	1.15	2*n*	Lewis
1902.40	188.8	1.02	2*n*	A
1903.46	187.1	1.00	2*n*	Biesbroeck

[Ma (*F. S.* I)...Ma (**IX, XI, XIII, XV**)...Ma (430)...Se (*Comp. Rend.* **XLVIII**, 375)...Se...Se^3...OΣ (**IX**)...Hd...Δ (1115, 2194)...Δ (**I, II**)...WS...WS^2...Gl...Sk^2...Flm...Sp (**II**)...Sp (2133)...O. Stone (2201)...Do (2316, 3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Lv^1....T (2991)....Per....Per (2748)...En (2663)...Jones (*A. J.* 312)...Hl (**II**)...Maw (**I**)...Glasenapp (**II**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)...Doolittle (*Pub. Flower Obsy.* I)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

15 36 **6457.** Measures by β^6; near No. 6462.

15 44 **6458.** **Σ 1735.** Fixed. The distance in Struve appears to be too small.

1867.92	110°0	4″16	3*n*	Δ
1879.35	108.9	4.20	2*n*	Cin
1893.33	109.9	4.18	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^5...Glasenapp (**II**)...*A. G. Leipzig*, p. 248...]

6459. **Σ 1737.** (= **H IV. 57 = H 224.**) Fixed. $15^m\ 58^s$

1869.30	220°3	15″09	4*n*	Δ
1898.38	220.3	15.38	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...H (**VII**)...Δ (**II**)...β^1...Glasenapp (**V**)...]

6460. **β 1084.** Discovered with the 36-inch. The later measures show no change. 15 59

1898.26	88°7	2″78	3*n*	A	7.2...13.5

[β (**XV**)...β (2929) (*Pub. L. O.* **II**)...A (3585)...]

6462. **Arg. 26.** "Duplex Cl. III" in O. Arg. S. These stars are SD (22°) 3572 and 3573. 16 3

1903.28	79°8	27″81	2*n*	β^6	8.5...8.6

In the field, about 7′ *np*, there is a pair of small stars (No. 6457).

6463. **H IV. 57.** The place in H is uncertain. There is no pair here. It is identical with Σ 1737. 16 12:

6464. **H IV. 119.** (= **Σ 1736** *rej.*) Erroneously called P XIII. 63 in H and Σ. Magnitudes in H (V), 7–8...11. The components are SD (12°) 3802 and 3801. 16 25

1902.18	311°3	19″16	2*n*	β^5	7.5...10.0

6466. **Ho 258.** The only later measures are the following: 16 33

1893.41	162°5	10″96	1*n*	Ho
1903.36	163.0	11.48	3*n*	Doo

[Ho (2977, 3234)...]

6468. **O. Stone 29.** From Cin^6. No other observations. 16 38

6469. **Σ 1738.** Unchanged. 16 51

1867.65	283°6	3″83	3*n*	Δ
1903.43	282.0	4.00	7*n*	Jouffray

[Ma (*F. S.* I)....Ma (**XI**)....Se....Δ (**II**)....Cin^5....Glasenapp (**II**)....Jouffray (*Bul. Ast.* **XXI**, 299)...]

6470. **Ho 259.** No motion. 16 55

1895.42	244°3	9″36	3*n*	Ho
1903.31	242.9	9.61	3*n*	Doo

[Ho (2977, 3558)...]

6471. **Σ 1739** *rej.* The only measures are: 16 57

1902.18	132°2	12″78	2*n*	β^5	9.2...10.0

$17^m 13^s$ **6472.** **H** 530. In W² 8-9m. H (V) 11°5 : 30″± : 9...10 (1830+).

17 28 **6473.** *Virginis* 504. **β** 610. (= **Hd** 137.) Discovered with the 18½-inch. Apparentlv without change. In Gould 6.9m. Lalande 24812.

1878.41	17°4	3″77	1*n*	Δ	7.0...10.5
1892.25	20.3	3.69	3*n*	β	7.5...10.3
1892.38	18.5	3.82	3*n*	Lv	7.1...11.8
1902.07	15.9	4.04	8*n*	Doo	

[β (**X**)...β¹...β (3142) (*Pub. L. O.* **II**)... Glasenapp (**I**) ... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

17 33 **6474.** **Σ** 1740. (= **Sh** 163.) These stars have nearly the same proper motion:

A = 0″217 in 6°0 Porter
0.201 in 351.9 Glasgow
0.202 in 359.5 *A. G. Albany*
B = 0.254 in 360.0 Porter
0.248 in 323.3 Glasgow

Very little relative motion.

1842.39	75°9	27″26	3	OΣ
1865.97	75.8	26.87	4*n*	Δ
1885.37	75.8	26.97	3*n*	Per
1893.33	75.2	26.75	2*n*	Gla

[Ma (*F. S.* **II**)...H¹... Ra (**XXIV**)...En...OΣ (**IX**)... Δ (1207) ... Δ (**I, II**)... Per...Per (2748)...Je (2351)...Glasenapp (**II, III**)...Giacomelli (**II**)...Engelhardt (**III**)...*Annals Toulouse Obsy.* **III**...Grant (*Mon. Not.* **XLIII**, 134)...]

18 **6476.** **Ho** 260. This star is noted "duplex 2″" in W². I looked for it once, about 1877, but found no double star. It would seem from its re-discovery by Hough that an important change had taken place in the distance. The later measures indicate some change in the angle.

1893.38	311°4	0″58	[illegible]	Ho
1896.39	311.8	0.70	3*n*	Ho
1896.48	314.7	0.80	3*n*	A
1898.36	318.0	0.78	4*n*	Doo
1899.48	311.6	0.84	1*n*	A
1900.37	318.4	0.77	2*n*	Lewis
1902.34	324.3	0.70	4*n*	Doo
1902.37	326.4	0.73	5*n*	Lewis

[Ho (2977, 3234, 3558) ... A (3395, 3639) ... Greenwich Obsy. (*Mon. Not.* **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)... Doolittle (*Pub. Flower Obsy.* **I**) (*A. J.* 547)...]

18 4 **6477.** **Σ** 1741. Glasenapp measures a wide pair 9ˢ *p* and 7′ *n*, 245°8 : 65″65 : 8.3...8.5 (1890.44) 2*n*. But little, if any, change in the Σ pair.

1867.66	262°5	24″88	3*n*	Δ
1879.33	262.5	25.73	1*n*	Cin
1890.44	261.5	25.34	2*n*	Gla

[Ma (*F. S.* **I, II**).... Δ (**II**)...Cin⁵...Glasenapp (**I**)...]

6478. **Σ** 1742. Without change. $18^m 12^s$

1866.72	348°6	1″15	3*n*	Δ
1898.26	349.4	1.33	4*n*	Doo
1903.34	352.2	1.29	1*n*	Do

[Ma (**XI**)...Se...OΣ (**IX**) .. Δ (1185)... Δ (**I, II**) ...WS...WS²...Gl...T (2991) Pt...Per...Per (2748). .Sk²...Lv¹...O. Stone (2201)...En (2663)...Cin⁵... Cin⁶...Sp (2133)... Sp (**II**)... Jones (*A. J.* 312) ... Glasenapp (**II**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXII**, 383; **LXIII**, 403; **LXIV**, 798) .... Doolittle (*Pub. Flower Obsy.* **I**) .... Do (3930) .... Coleman (*Mem. R. A. S.* **LIV**)...]

6479. **β** 460. Discovered with the 6-inch. There is no indication of motion. 18 40

1892.38	34°8	2″26	3*n*	Lv
1892.39	33.9	2.13	3*n*	β
1901.32	33.1	2.22	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β¹...β (3142) (*Pub. L. O.* **II**)... Δ (**I**)... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Doolittle (*Pub. Flower Obsy.* **II**)...]

6480. **Σ** 1745 *rej.* The only measure is the following: 18 53

1905.45	199°5	20″28	1*n*	β⁶	8.2...10.5

6481. **Σ** 1743. Unchanged. 19 5

1867.68	75°8	5″58	3*n*	∠
1880.33	76.0	5.32	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V, VIII**)...Se... Δ (**II**)...Cin⁵...β³...Glasenapp (**I**)...]

6482. ζ *Ursae Majoris.* **Σ** 1744. (= **H** **III.** 2 = **Sh** 164.) 19 5
No material change. The principal star has a small proper motion:

Auwers 0″120 in 101°6
Bossert 0.131 in 103.2

There are many measures. The following are sufficient to show the relation of the components:

1846.55	147°9	14″39	9*n*	OΣ
1868.84	147.9	14.26	5*n*	Δ
1896.49	149.1	14.53	3*n*	Hu
1904.57	149.7	14.47	5*n*	Lau

ζ *Ursae* was found to be a spectroscopic binary at Harvard (*Mon. Not.* L, 296).

[H¹....Ma (324)....Ma (*Beitrage zur physischen Kenutniss der himmlischen Korper*, Weimar, 1841)....Ma (**IX, X, XI, XIII, XV**)....Ma (*F. S.* **I**)....Ma (*Comp. Rend.* **XIII**, 438)... BM (280)...Bes...Ek (**I**)...K (409)...*Ast. Jahr* 1806....*Gr. Obsns.* 1840....Mu....Auwers (1393, 1411, 1416).... Lu (1103).... Lu (**I, II, III**)... Se¹... Se³... Da²... Da³...Wh...P¹... En (1518, 1674)... Ra (**XXII, XXIX**) ... OΣ (**IX**) ... *Durham Obsns.* 1846-48 ... Schmidt (1543) ...Ba (**I, II, III**)...Bond (1105, 1129, 1158)...Flm... Δ (*Mem. Accad. Sci.*)... Δ (1209)... Δ (**I, II**)...Amici (2155)...Pogson (*Brit. Ass'n Rep.* 1858)...Du... Pk...WS...Gl...Sk²... Hl (*Wash. Obsns.* 1885) (*A. J.* 247)...Hl (**I, II**)... Engelhardt (**II**)... Schur (2255)... Je (2351, 2772)... Franz (2590)...Per...Per (2748)...T (2866)...Sadler (*Liv. Ast. Soc.* **V**, 198)...β²...Maw (**I**)...Glasenapp (**III, IV, V**)... Big (*Bul. Ast.* **XII**, 299)... Cohn (3240)...Hagen (3258) ....Hu (*A. J.* 397).... Chofardet (3450).... Greenwich Obsy. (*Mon. Not.* **LX**, 518) .... *Annals Toulouse Obsy.* **III** .... Gore (*Mon. Not.* **LXIII**, 171) .... Do (3930)... Coleman (*Mem. R. A. S.* **LIV**)...Lau (*Bul. Ast.* **XXII**, 238)...]

19^m 8^s **6483.** OΣ 265 *rej.* Rejected for distance in second edition of the *Poulkowa Catalogue.* Companion not seen by Dembowski in 1866; the 6-inch showed it in 1874 and 1877.

1897.39	276°5	21″65	4*n*	Doo
1899.49	278.6	21.64	2*n*	Hu

[Ma (**XI, XIII**)... Δ (**I**, p. 229)... β (*Mon. Not.* **XXXIV**, 393)... Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

19 43 **6484.** **O. Stone** 30. Probably fixed.

1903.46	356°0	1″60	2*n*	Scott

[Cin^5...Cin^6....LM...Scott (*Mon. Not.* **LXIV**, 72)...]

19 58 **6486.** **H** 1231. "Two more exactly in one line *sp*; the most distant (90″) very red." The principal star is DM (41°) 2393.

1903.06	9°9	21″71	2*n*	β	8.8...12.5

A and DM (41°) 2392

1903.06	233°2	94″60	2*n*	β

[β^6...Espin (*Mon. Not.* **LXIV**, 678)...]

20 37 **6488.** **β** 1107. Discovered with the 36-inch.

1897.37	132°4	1″05	3*n*	A
1901.13	137.0	1.01	3*n*	Doo
1905.12	134.1	1.05	3*n*	Doo

[β (**XVI**).... β (2956) (*Pub. L. O.* **II**).... A (3465).... Doolittle (*Pub. Flower Obsy.* **II**)...]

20 59 **6490.** **β** 237. Discovered with the 6-inch. This system has a proper motion of 0″189 in the direction of 152°1 (Porter). It is probably a physical pair, but the relative change is slow.

1883.44	204°2	2″91	3*n*	Ho
1883.64	207.7	2.95	7*n*	En
1899.07	200.1	3.12	1*n*	β
1905.12	204.1	3.19	3*n*	Doo

[β (**V**)... β (*Mon. Not.* **XXXV**, 31)... Δ (**I**)... En (2678)... Ho (2978)... Brown (3645)...Doolittle (*Pub. Flower Obsy.* **II**)...]

21 24 **6491.** **A. G.** 187. Double in *A. G. Berlin.*

[Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...]

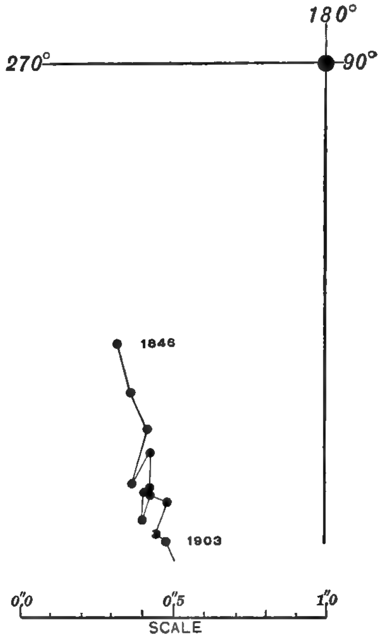
22 11 **6493.** **Σ** 1746. The distance is diminishing, probably from proper motion.

1868.06	249°5	27″98	4*n*	Δ
1880.62	250.1	27.57	2*n*	Pt
1898.27	249.5	27.50	3*n*	Doo

[Ma (*F. S.* **II**)... Ma (**XIII, XV**)... Flm... Δ (1800)... Δ (**II**)... Pt... *A. G. Leipzig*, p. 209... Doolittle (*Pub. Flower Obsy.* **I**)...]

6494. **OΣ** 266. The motion is apparently rectilinear. 22^m 35^s

1846.10	324°2	1″16	4*n*	OΣ
1851.38	329.0	1.27	5*n*	Ma
1870.37	334.4	1.35	6*n*	Δ
1874.40	335.7	1.57	1*n*	OΣ
1877.41	336.0	1.42	5*n*	Sp
1879.41	337.8	1.53	3*n*	Hl
1884.41	338.1	1.55	3*n*	Hl
1886.46	338.4	1.63	2*n*	Per
1893.17	337.9	1.54	5*n*	HΣ
1894.80	340.5	1.55	5*n*	Com
1898.26	340.3	1.66	3*n*	Hu
1903.30	341.7	1.67	2*n*	Do



OΣ 266

[Ma (**XI, XIII**)....Da^3....OΣ (**IX**)....Se....Δ (**I**)....WS^2....Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Sp (**II**)...Per...Per (2685)...En (2678)...Do (2307, 3930)...Ho (3234)...Glasenapp (**II, IV**)...Maw (**II, III**)...Com (**X**)...HΣ (**XII**)... Hu (*Pub. L. O.* **V**).... Doolittle (*Pub. Flower Obsy.* **I**).... Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LVI**, 359; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)...]

6495. **Σ** 1747. Fixed. 22 42

1866.24	346°2	14″72	3*n*	Δ
1904.28	344.6	15.09	1*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)...WS (called Σ 1746)...WS^2...Sk...Sk^3... Δ (**II**)...Sk^5...]

6496. **H** 2653. "Rather difficult." 22 44

1880.34	237°2	20″79	1*n*	Cin^6	8.0...12.0

6497. **A. G.** 188. Double in *A. G. Berlin.* 22 59

1903.32	245°8	4″21	3*n*	A

[Cogshall (*A. J.* 546)...]

23^m 2^s **6498.** **OΣ (App) 123.** B is Rad^1. 3021. The proper motions, from meridian observations, are given by Schroeter:

A = 0″.117 in 295°.9
B = 0.098 in 289.1

There is no relative change, and the motion is therefore the same for each star.

1905.29	147°.1	68″.85	1*n*	β

[Δ (I)...Bl (V)...Franz (2649)...β^6...]

23 9 **6499.** **OΣ 267.** Rapid motion would be expected in a pair of this kind, but the measures indicate no sensible change. The observation by Ma is erroneous, or it belongs to some other pair.

The following are all the measures:

1849.60	300°.8	0″.25	2*n*	OΣ
1852.69	12.0	0.5±	2*n*	Ma
1872.43	314.8	obl.	3*n*	Δ
1881.35	306.8	0.33	2*n*	β
1890.53	307.2	0.25±	1*n*	HΣ
1891.23	309.2	0.29	3*n*	β
1898.71	132.4	0.30	3*n*	Hu
1899.33	321.6	0.31	2*n*	Brown

Hussey states that the smaller component was certainly the southern member, and hence the other angles given above should be reversed.

[Ma (**XIII**)...OΣ (**IX**)...Δ (I)...β^4...β (3114)(*Pub. L. O.* **II**)...Brown (3645)... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

23 10 **6500.** **β 113.** Discovered with the 6-inch. Slow angular motion, and probably binary. These are all the measures:

1875.32	188°.8	1″.57	4*n*	Δ
1891.25	197.2	1.45	3*n*	β
1896.50	203.8	1.32	3*n*	A
1898.32	204.2	1.39	3*n*	A
1899.43	206.0	1.30	1*n*	Brown
1903.50	208.4	1.84	1*n*	Bowyer
1905.10	209.3	1.64	7*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....β (3114) (*Pub. L. O.* **II**).... Δ (**I**).... A (3395, 3585)....Bowyer (*Mon. Not.* **LXIV**, 798)....Doolittle (*Pub. Flower Obsy.* **II**)....Brown (3645)....]

23 10 **6501.** *R Hydrae.* **Ho 381.** The large star is a well-known variable, with a period of about 425 days. The magnitude varies from about 4m to 10m.

1895.57	325°.1	20″.78	4*n*	Ho	...11.8
1903.30	323.9	21.39	3*n*	Doo	

[Ho (3233, 3558)...Chandler (2463)...]

23 24 **6502.** **Σ 1748.** Relatively fixed, but the components have a common proper motion of 0″.257 in 276°.7 (*A.G. Berlin*).

1871.46	181°.4	5″.67	6*n*	Δ
1903.33	181.0	5.81	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**V**)...Δ (**II**)...Cin^5...]

6505. **Ho 540.** A later position is: 23^m 51^s

1903.72	194°.9	13″.16	5*n*	Doo

[Ho (3557)...]

6508. *Ursae Majoris* **426.** **S 649.** (= σ 440 = **♅ VI. 22.**) 24 3
B. A. C. 4510. No measures by ℌ. B is double (= Σ 1752). The large star has a proper motion of 0″.079 in 292°.1 (Bossert).

6509. 72 *Virginis.* **Σ 1750.** (= **♅ N. 27.**) The measures are not very accordant, and change is uncertain. Not measured by ℌ. The proper motion of the principal star is very small, 0″.044 in 17°.8 (Auwers). These are all the measures since Struve: 24 10

1847.82	16°.5	29″.60	1*n*	Ma
1852.22	16.8	28.98	1*n*	Σ
1867.64	16.5	29.40	3*n*	Δ
1879.30	16.6	30.68	3*n*	Cin
1879.30	16.1	29.24	2*n*	β
1897.40	16.5	29.91	3*n*	Doo

[Ma (*F. S.* **II**)....Ma (**XIII**)....H (**IV**)....OΣ (**IX**)....Δ (**II**)....Cin^5....β^3.... Doolittle (*Pub. Flower Obsy.* **I**)...]

6510. **Σ 1752.** No material change. This pair is B of S 649. (See No. 6508.) 24 26

1867.04	146°.4	1″.56	3*n*	Δ
1879.32	143.2	1.42	1*n*	Cin
1899.45	141.4	1.33	1*n*	Bryant

[Ma (*F. S.* I)...Ma (**XIII, XV**)...Δ (**II**)...Cin^5...Bryant (*Mon. Not.* **LX**, 504)...]

6511. **Σ 1751.** Unchanged. 24 41

1867.35	61°.4	5″.83	3*n*	Δ
1905.05	58.9	5.87	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^5...β^6...]

6512. **OΣ 268** *rej.* (AC = **♅ V. 70** = **H 2657** = **OΣ (App) 124.**) The faint star not seen by Δ in 1866. The angle of AC in ℌ is erroneously printed 277°.0. The proper motions are given by Rechenberg (3482): 25 8

A = 0″.063 in 72°.4
C = 0.010 in 173.8

The following are all the measures of AC:

1783.18	263°.0	56″.93	1*n*	ℌ
1876.07	259.4	67.57	3*n*	Δ
1878.27	259.0	67.86	1*n*	β
1893.95	258.7	69.07	4*n*	Franz
1897.38	258.5	69.13	4*n*	Doo
1900.13	259.3	69.69	3*n*	Hu

These are all the later measures of the faint star:

1897.38	76°.6	20″.09	3*n*	Doo	...13.0
1900.13	77.2	19.45	3*n*	Hu	...12.5

[Sadler (*Mon. Not.* **XLV**, 322).... Δ (**I**, pp. 229, 256).... β^1.... Franz (3464).... Hu (*Pub. L. O.* **V**)...Doolittle(*Pub. Flower Obsy.* **I**)...]

25m 32s **6513.** **H 4593.** The R. A. in H "doubtful for want of zero stars." Examined and identified as here given. The angle is reversed in one of the Cin measures.

1879.36	271°.2	27″.13	2*n*	Cin	8.5...9.5
1891.38	272.7	26.45	1*n*	Ho	8.0...8.5
1903.18	92.1	26.57	2*n*	β	8.9...9.1

[Cin^5...Ho (3234)...β^6...]

25 41 **6515.** **H 531.** Measures from H (V). In H (II) and W^2 9m; DM 8.8m.

26 3 **6516.** **Sh 165.** (= ♅ V. 128 = σ 441.) Probably fixed. The distance in ♅ appears to be much too small, and the stars too bright in Sh. The following, which are all the other measures, show no motion:

1783.27	....	41″.80	1*n*	♅	
1840.36	78°.6	47.50	2*n*	OΣ	8.0...9.0
1879.34	78.6	47.90	3*n*	Doubiago	
1881.43	79.5	48.01	2*n*	β	7.0...7.7
1904.34	78.7	47.95	2*n*	β	8 ...9

[OΣ (X)...β^4...β^6...]

26 27 **6518.** 75 *Virginis.* **H 2658.** The large star has a proper motion of 0″.075 in 270°.0 (Auwers). The following are all the measures:

1879.31	110°.1	78″.29	2*n*	β^3	...11.2
1902.18	110.0	79.62	2*n*	β^5	...12.0

There is a faint star much nearer A:

1902.18	320°.1	18″.90	2*n*	β^5	...13.5

26 40 **6519.** **A. G. 189.** Double in *A. G. Lund.* No companion seen with the 40-inch on two nights in 1903.

26 46 **6520.** **Hn 15.** No change.

1888.41	296°.3	16″.25	2*n*	Com

[β^4...Com (VI)...En (2678)...]

26 59 **6522.** **Σ 1755.** Fixed.

1869.50	132°.8	4″.37	5*n*	Δ
1897.48	132.8	4.32	4*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Wr...Se...Ra (**XXIII**)...Ba (**IV**)...Du...Δ (1185)...Δ (I, **II**)...Per...Per (2748)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...Bryant (*Mon. Not.* **LX**, 504)...Coleman (*Mem. R. A. S.* **LIV**)...Giacomelli (**II**)...]

27 7 **6523.** **A 567.** The principal star has a proper motion of 0″.22 in 148°.5.

[A (*Bul. L. O.* No. 50)...]

27m 25s **6524.** **OΣ 269.** Always a difficult object, and without doubt a binary system, but the measures are more or less uncertain and inconsistent. Three orbits have been found:

1891	Burnham	48.4 yrs.	*Pub. L. O.* II, 242
1891	Gore	47.7	*Mon. Not.* LII, 550
1895	See	48.8	*Evolution of Stellar Systems*

These are all based on practically the same data, and depend entirely upon a reversal of the angle about 1880, and the general accuracy of the observation of 1883, placing the smaller component in the first quadrant. That measure is by no means certain in this regard, and if a correction of 180° is required, then it follows that there has been no material change since 1843, the differences shown in the measures being explained by unavoidable errors in a pair of this class. It will probably require the measures of many years to determine with certainty what the fact is. The distances in the observations of the first forty years are practically all estimated, and the angles correspondingly approximate. Hussey has collected all the observations to 1900 (*Pub. L. O.* V), negative and otherwise, and pointed out the weakness of the evidence which has been construed to favor rapid angular motion.

The following will be sufficient to show the general relation of the components to the present time:

1843.36	209°.6	0″.25±	3*n*	Ma
1844.31	218.0	0.33±	1*n*	OΣ
1846.29	222.7	0.25±	1*n*	Ma
1846.39	230.5	0.39	1*n*	OΣ
1847.41	215.1	0.18±	1*n*	Ma
1849.47	218±	Obl.	1*n*	OΣ
1851.39	228.9	0.33	1*n*	OΣ
1855.47	223.6	0.27±	1*n*	OΣ
1861.26	242.8	0.33±	1*n*	OΣ
1865.50	225±	Obl.	1*n*	Δ
1872.47	257.1	Obl.	1*n*	OΣ
1877.26	Dubbia, obl. 180°?		1*n*	Δ
1881.42	Single		2*n*	β
1883.41	61.4	0.22	4*n*	En
1885.41	15±	Obl.	2*n*	Per
1891.26	213.4	0.22	3*n*	β
1892.40	215.0	0.21	2*n*	β
1896.53	214.1	0.43	1*n*	A
1897.05	215.3	0.28	3*n*	A
1898.27	223.1	0.31	3*n*	A
1899.25	225.1	0.28	4*n*	Hu
1899.36	219.9	0.31	3*n*	A
1902.32	224.2	0.24	2*n*	A
1903.35	218.9	0.26	2*n*	Bryant
1903.41	223.7	0.32	4*n*	Biesbroeck
1904.05	225.4	0.38	3*n*	Doo

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**, p. 229)...Per...Per (2749)...Big...En (2678)...Gore (*Mon. Not.* **LII**, 550)...β^4...β (*Observatory*, **XIV**, 263)...β (3114, 3142) (*Pub. L. O.* **II**, pp. 79, 242)...Everett (*Mon. Not.* **LVI**, 464)...See (*A. J.* 359, 378) (*Evolution of the Stellar Systems*)...Com (**X**)...Glasenapp (**IV**)....HΣ (**XII**)....Brown (3645)....Hu (*Pub. L. O.* **V**)....Doolittle (*A. J.* 416) (*Pub. Flower Obsy.* **I, II**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)....A (3395, 3465, 3585, 3639)....Biesbroeck...]

6526. **Σ 1756.** Fixed. 27 38

1867.07	177°.4	14″.17	3*n*	Δ
1905.05	177.5	14.40	1*n*	β

[Ma (**XI, XIII**)...Ma (*F. S.* **I**)...Δ (**II**)...β^6...]

27m 56s **6527.** **Σ 1758.** No material change. These stars are given a proper motion of 0″039 in 0° (*A. G. Harvard*).

1866.68	307°4	3″94	3*n*	Δ
1900.90	305.4	4.47	4*n*	Espin

[Ma (*F. S.* **I**)... Ma (**XIII, XV**) ... H^1... Δ (1207)... Δ (**I, II**)...WS ...WS^2... Gl...Bryant (*Mon. Not.* **LX**, 504)...Espin (*Mon. Not.* **LXII**, 529)...]

28 0 **6528.** **β 114.** Discovered with the 6-inch. Probably without change. Some of the later positions are:

1876.91	134°6	1″43	4*n*	Sp
1885.32	139.4	1.50	4*n*	W
1888.36	138.8	1.34	3*n*	T
1890.07	138.0	1.58	3*n*	Maw
1893.37	140.7	1.41	3*n*	Jones
1900.38	139.7	1.44	2*n*	A
1902.21	144.3	1.46	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (I)...Δ (2086)...WS^2...Cin^3...Cin^4 ....Cin^5....Cin^6....Wilson (Cin^{10}) ....Sp (**II**)....LM....Lv^1....T (2991).... Glasenapp (I)...Maw (I)... Jones (*A. J.* 312)... Scott (*Mon. Not.* **LXIV**, 52) ...A (*Bul. L. O.* No. 11)... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

28 9 **6529.** **S 650.** The components are SD (12°) 3841 (8.8) and 3842 (9.1) The only measure since 1825 indicates a large change in angle and distance.

1904.34	138°5	49″16	2*n*	β	8.0...8.7

[H (**V**)...β^6...]

28 9 **6530.** **Σ 1757.** **B. A. C. 4530.** Perhaps a binary, but the observed positions to this time are as consistent with the hypothesis of rectilinear motion as any other. As the principal star has a considerable proper motion, this may be a system of the 61 *Cygni* type. This proper motion is given:

Porter	0″270 in 277°9
Rad^3.	0.271 in 274.2

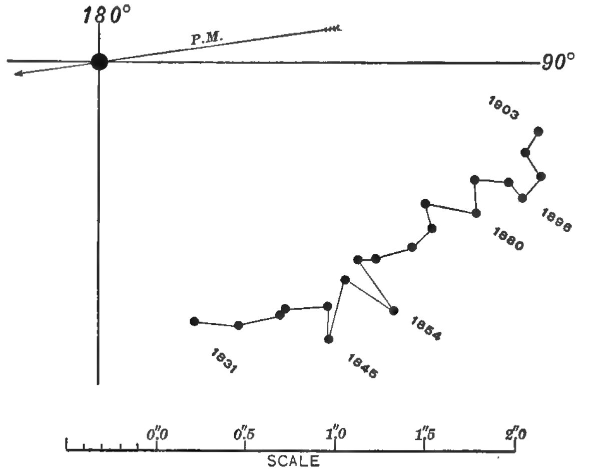
It will probably require the measures of at least another half a century to determine whether the relative change is due to orbital or proper motion.

The general character of the movement will be seen from the following selected positions:

1831.78	21°0	1″54	7*n*	Σ
1836.08	28.5	1.68	3*n*	Σ
1841.38	36.0	1.75	3*n*	Ma
1843.35	37.4	1.74	2*n*	Ma
1844.72	43.7	1.89	3*n*	OΣ
1845.87	40.8	2.02	2*n*	Ma
1850.38	48.8	1.85	3*n*	OΣ
1854.37	50.2	2.16	5*n*	Ma
1856.88	52.9	1.84	2*n*	Se
1858.37	54.8	1.91	2*n*	Ma
1864.64	59.7	2.05	10*n*	Δ
1871.44	63.7	2.09	8*n*	Δ
1875.31	66.6	2.00	4*n*	Sp
1880.36	68.2	2.28	3*n*	Hl
1886.41	72.6	2.21	3*n*	Hl
1891.45	73.7	2.40	3*n*	Hl
1896.43	72.4	2.50	3*n*	A
1898.08	75.5	2.56	1*n*	Hu
1901.25	78.1	2.45	3*n*	β
1903.44	81.1	2.50	2*n*	Biesbroeck

The following orbits have been published:

1879	Casey	401.0 yrs.	*A. N.* 2415
1879	Casey	291.8	*A. N.* 2438
1883	Gore	340.38	*Mon. Not.* XLVII, 12
1887	Gore	276.92	*Mon. Not.* XLVII, 478



Σ 1757

[Ma (*F. S.* **I**)...Ma (430)... Ma (**IX, XI, XIII, XV**)...Wr... Se... Bp...WJ^2... J^3...Da^3...Da^4...Ba (**II, III, IV**)...Bru...K (1519)...Hd...En (1674, 2663) ...OΣ (**IX**)...Δ (*Mem. Accad. Sci.*)... Δ (1031, 1111, 1256, 1474, 1735, 1886) ...Δ (**I, II**)...Pl...Flm...Do (2092, 2198, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Gl...WS^2...Sk...Sk^2...Sk^3...Sk^4...Sk^5...Pt...Hl (*Wash. Obsns.* 1880–86)....Hl (**I, II**)....Sp (2133)....Hl (*A. J.* 269).... Sp (**I, II**).... T (2898) (*Liv. Ast. Soc.* **VI**, 122)....Big....Casey (2415, 2434, 2438) orbit.... Gore (*Mon. Not.* **XLVII**, pp. 12, 478) orbit...Jones (*A. J.* 312)...Lv^1...*Proc. Haverford Coll. Obsy.* 1891...Glasenapp (**I**)...Searle (*A. J.* 299)...Ho (3234) ...Maw (**I, II, III**)...A (3395)...β (*Pop. Ast.* **IV**, 172)...Com (**X**)...Coleman (*Mem. R. A. S.* **LIII**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LX**, 504; **LXIV**, 798)...Lewis (*Observatory*, **XXV**, 269)...Biesbroeck...β^5...]

(See p. 1075)

6531. **Σ 1759.** (= **H 532.**) Fixed. These stars have a common proper motion of 0″224 in 280°8 (*A. G. Nico.*). 28m 9s

1868.23	154°3	9″75	4*n*	Δ
1905.05	153.9	9.94	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...β^6...]

6532. **H 2659.** "One of the most difficult, but a haze is come on. Requires verifying." No companion seen with 18½-inch in 1878, and the 40-inch in 1901 showed nothing nearer than a 13 m star, 202°3 : 38″7. 28 11

[β^1...β^5...]

6534. **β 932.** *Virginis* 550. (= **B. A. C. 4531** = Z *Virginis.*) Discovered with the 18½-inch. The measures of the distant star indicate a proper motion of A of 0″08 in the direction of 305°7. Evidently this belongs to both components, as there has been no sensible relative motion. 28 18

This is a naked-eye star in *Virgo* and said to be variable, 5 to 8 m, by Schmidt in 1866. It seems to have been neglected since that time by variable star observers. It would be specially interesting to know in which, if only one, of the close stars the variability occurs. This is Z *Virginis* of some of the variable star catalogues.

The following are the later measures:

A and B

1881.37	84°9	0″51	3*n*	β
1884.42	83.8	0.34	3*n*	Hl
1888.26	81.6	0.51	3*n*	T
1898.32	84.3	0.44	4*n*	A
1899.43	93.7	0.36	2*n*	Brown

AB and C

1898.32	153°5	25″15	5*n*	A
1899.30	153.6	25.10	2*n*	β

[β (**XIII**)....β^3. ..β^4....β (*Observatory*, **III**, 92)(*Pub. Y. O.* **I**).... Hl (**II**).... T (2991)...*Nature*, **XXVII**, 617; **XXX**, 325...A (3585)...Brown (3645)...]

28^m 46^s **6536.** **Σ 1760.** (= **Sh 166.**) Fixed.

1866.02	64°8	8″54	3*n*	Δ
1889.31	63.4	8.21	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Se...Wr...Ra (**XXIV**)...Δ (**II**)...Je (2351)... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

29 0 **6538.** **H 1233.** "R. A. very doubtful." Identified and measured:

1903.28	106°7	17″94	2*n*	β^6	9.1...10.5

29 2 **6539.** **Σ 1761.** Probably without change.

1867.05	72°2	20″32	3*n*	Δ
1879.32	71.4	20.54	2*n*	Cin
1896.64	71.6	20.38	3*n*	A
1896.58	71.2	20.62	3*n*	Eichelberger

[Ma (*F. S.* **II**)...H (**V**)...Δ (**II**)....Cin^5... A (3395) ... Eichelberger (*A. J.* 397) ..*Annals Toulouse Obsy.* **III**...]

29 4 **6540.** **H 1234.** In another observation, 8...12. In W^2 7 m.

1902.31	23°4	33″36	3*n*	Espin	7.5...11.3

[Espin (*Mon. Not.* **LXII**, 532)...]

29 7 **6541.** **β 933.** (AC = **H 2661.**) The close companion to the principal star of H 2661 was discovered with the 18½-inch. There seems to be some change in the angle of AC, probably from proper motion.

A and B

1888.68	29°0	2″09	2*n*	Lv
1891.11	31.6	2.29	3*n*	Sp
1895.41	31.0	2.20	2*n*	Sp
1898.27	29.0	2.44	3*n*	Doo
1898.37	29.5	2.32	3*n*	A

A and C (= H 2661)

1830	28°0	30″ ±	1*n*	H
1898.27	17.6	34.46	3*n*	Doo
1898.37	16.5	34.71	3*n*	A

[β (**XIII**)...β^3... Big ... Lv^1... Sp (**III**) ... A (3585) ... Doolittle (*Pub. Flower Obsy.* **I**)...Brown (3645)...]

6544. **H 2662.** Nothing since Herschel but the following: 29^m 24^s

1879.25	286°0	25″64	2*n*	β^3	8.9...9.5

(See p. 1075)

6545. **H 228.** B is W^1 XIII. 483. The only measures are: 29 35

1828.33	15°7	70″21	1*n*	H^1	7 ...9
1897.36	15.2	70.12	3*n*	Doo	7.0...9.0

[H^1...Doolittle (*Pub. Flower Obsy.* **I**)...]

6546. **S 651.** (= **H N. 69.**) H calls this *f Hydrae*, but not so in Arg. In B A. C. 6 m. No measures by H. The estimates of magnitudes differ widely. 30 9

As these stars have remained relatively fixed, the proper motion is common to the components.

Kustner 0″114 in 275°5
Bossert 0.148 in 270.0

1834.49	191°5	10″04	3*n*	H	6 ...7
1880.38	192.0	10.04	2*n*	Cin	6.4...7.6
1884.36	191.8	9.99	2*n*	Wilson	7.0...8.0
1890.41	191.7	9.80	2*n*	Gla	4.7...5.5
1897.46	191.6	10.23	1*n*	See	5.7...8.8

[Dun... H^3... Se^1... J^2... Johnson (*Mon. Not.* **XLVIII**, 257)... Cin^3... Cin^4... Cin^5....Cin^6....Wilson (Cin^{10})....Glasenapp (**I**)....Scott (*Brit. Ast. Ass'n* **V**, 75)...See (3496)...]

6547. **Hu 741.** With a later measure the mean is: 30 16

1903.57	58°0	0″24	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

6548. **H 4599.** "A double star *sf* a neb." This is a 5″ pair of very small stars, about 11 m (1877). The nebula is *Messier* 83 (Dreyer 5236). 30 29

6551. **Σ 1767.** No change, but the stars have a common proper motion of 0″215 in 292°4 (Schroeter). 30 39

1866.70	352°1	4″55	3*n*	Δ
1905.29	350.0	4.41	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Seagrave (*Sid. Mess.* **II**, 274)...Cin^5...*Annals Toulouse Obsy.* **III**...β^6...]

6553. **H 3340.** "Very difficult." Nothing later but the following: 30 47

1878.24	217°2	2″27	1*n*	β^1

(See p. 1075)

6554. **A. G. 190.** Double in *A. G. Harvard.* Measures by Espin (*Mon. Not.* LXII, 532). 30 48

6555. **Kr 42.** Noted as "duplex" in *A. G. Hels.* 31 8

1898.36	218°4	3″61	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

$31^m\ 14^s$ **6556.** **Σ 1762.** No relative change, but a common proper motion of 0″190 in 144°6 (Porter).

1867.91	283°1	4″53	3*n*	Δ
1901.47	281.3	4.81	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**I**)...]

31 15 **6557.** **β 611.** Discovered with the 18½-inch. Unchanged.

1893.37	263°2	4″68	2*n*	Wilson
1898.44	258.8	4.86	3*n*	A
1901.33	260.3	4.67	2*n*	β
1905.33	258.8	4.64	3*n*	Doo

[β (**X**)...β^1...Wilson (Cin^{10})...Cin^6...A (3585)...β^5...Doolittle (*Pub. Flower Obsy.* **II**)...]

31 18 **6558.** 81 *Virginis.* **Σ 1763.** (= **H̥ I. 80 = Sh 167.**) No evidence of change since the first measures. The large star has a proper motion of 0″061 in 228°2 (Auwers), and the companion is moving with it.

1868.16	42°3	2″63	4*n*	Δ
1875.38	40.7	2.69	4*n*	Sp
1893.33	44.1	2.86	2*n*	Gla
1903.42	40.9	2.53	5*n*	Jouffray

[Ma (*F. S.* **I**)... Ma (**IX, XI, XV**)... Ma (324)... H^1... H (**VIII**)... Bp...Wr... Da^3...Ra (**XXII**)...Ba (**II**)...Se...Δ (1111)...Δ (**I, II**)...WS^2...Pt...Cin^5 ...Cin^6...Wilson (Cin^{10})...Sp (**II**)...T (2991, 3185)...Glasenapp (**I, II, IV**)... *Annals Toulouse Obsy.* **III**...Jouffray (*Bul. Ast.* **XXI**, 299)...]

31 38 **6560.** **Σ 1764.** *Red : blue*, H. No change.

1867.55	31°7	15″86	4*n*	Δ
1904.05	32.0	15.69	2*n*	β

[H (**IV**)...Ma (**XI**)...Ma (*F. S.* **I**)....Δ (**II**)...β^6...]

31 43 **6561.** **Σ 1766.** Fixed. The components have a common proper motion of 0″167 in 270°0 (Bossert).

1866.01	68°3	20″11	3*n*	Δ
1880.45	67.9	19.97	1*n*	β
1905.16	67.2	20.08	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**). Cin^5...β^3...β^6...]

31 45 **6562.** **H 1237.** The R. A. in H is about 1½^m too large. In the field with DM (−0°) 2714.

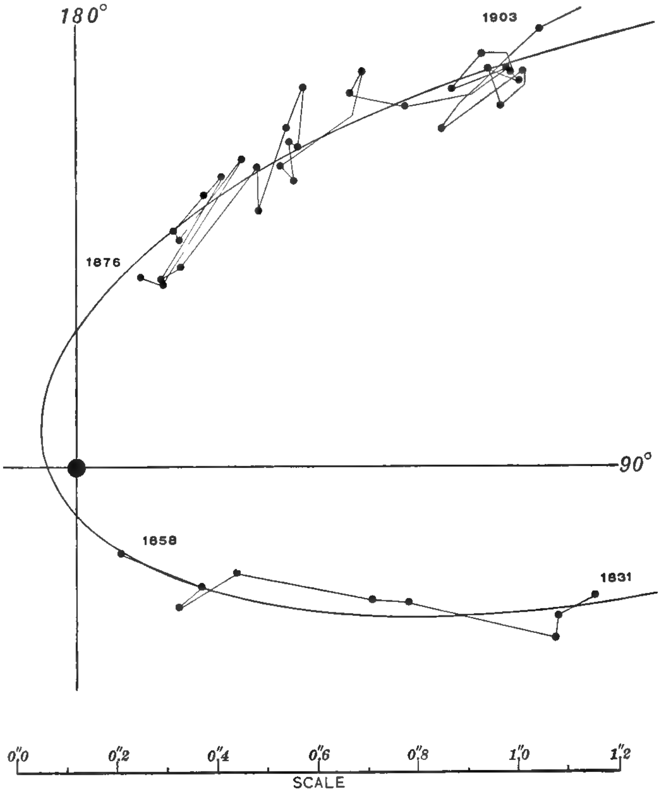
1904.11	8°3	11″94	2*n*	β^6	10.3...11.7

31 46 **6563.** **Σ 1765** *rej.* This is in the field with Σ 1764. Measures from β^6.

32 2 **6565.** **H 2666.** Nothing but the following since Herschel:

1901.32	179°8	14″30	3*n*	β^5

6566. 25 *Canum Ven.* **Σ 1768.** A binary of long and uncertain period, although the motion since the measures of Struve amounts to more than 300° in position-angle. A great variety of ellipses will equally well represent even the best measures, as will be seen from the selected positions given. It is probable that it will require the measures of at least another half century for the determination of an approximate period. The ellipse shown on the diagram would give a period of nearly 500 years. $32^m\ 7^s$



Σ 1768

Some of the positions are:

1831.51	76°0	1″07	10*n*	Σ
1841.17	72.6	1.01	4*n*	OΣ
1843.35	70.2	1.02	2*n*	Da
1846.80	67.8	0.72	3*n*	OΣ
1849.77	65.6	0.65	3*n*	OΣ
1851.28	56.5	0.39	4*n*	Ma
1854.43	36.2	0.35±	3*n*	Da
1854.78	46.2	0.35±	2*n*	Ma
1858.65	26.7	0.2±	2*n*	Ma
1859–72	Single			OΣ
1875.36	Round			Hl
1876.45	161.4	0.4±	4*n*	Sp
1877.39	154.5	0.4±	10*n*	Sp
1878.41	151.8	0.75	4*n*	Δ
1879.43	155.7	0.5±	5*n*	Sp
1879.49	157.5	0.51	5*n*	Hl
1880.46	155.0	0.60	2*n*	β
1881.40	153.4	0.65±	5*n*	Sp
1881.43	155.9	0.41	3*n*	β

1882.43	152°.7	0″.45	3*n*	Hl
1883.46	149.0	0.7±	5*n*	Sp
1884.42	145.5	0.63	3*n*	Hl
1885.32	148.2	0.8±	9*n*	Sp
1885.37	149.1	0.89	3*n*	Per
1886.45	145.2	0.78	4*n*	Hl
1886.51	146.7	0.78	4*n*	Sp
1887.41	142.7	0.72	9*n*	Sp
1888.44	145.8	0.73	3*n*	Hl
1889.48	144.0	0.98	4*n*	HΣ
1891.51	143.6	0.93	3*n*	Maw
1892.17	137.5	0.98	3*n*	β
1895.18	132.5	1.18	8*n*	Barnard
1896.31	135.1	1.07	3*n*	Com
1898.13	135.3	1.16	3*n*	A
1899.21	132.0	1.18	3*n*	A
1899.34	130.9	1.18	3*n*	Doo
1900.53	133.9	1.15	3*n*	Doo
1901.45	130.3	1.12	3*n*	Bowyer
1902.29	131.3	1.20	1*n*	Bryant
1902.32	132.7	1.08	2*n*	A
1903.32	132.5	1.00	5*n*	Biesbroeck
1903.49	133.2	1.28	8*n*	Doo

Two orbits have been computed of this pair:

1880	Doberck	119.92 yrs.	*A. N.* 2345
1895	See	184.0	*Evolution of Stellar Systems*

[Ma (*F. S.* **I**)...Ma (**IX, XI, XIII, XV**)...Da^4...Bp...OΣ (**IX, X**)...Δ (1736)...Δ (**II**)...Do (2156, 2345, 2433, 3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Du...Flm...WS...Sk...En (2663)...Per...Per (2529, 2748)...Sp (2133)....Sp (**I, II**) (**II** App)....T (2866)....Perry (*Eng. Mech.* **XXXVIII**, 192)....Jones (*A. J.* 312)...Hl (*Wash. Obsns.* 1880–84, 1886)....Hl (**I, II**)...Maw (**I, III, IV**)...β^3...β^4...β (3142) (*Pub. L. O.* **II**)...Sp (**III**)...Big (*Bul. Ast.* **XII**, 299)....Barnard (*A. J.* 447)....Collins (*A. J.* 378)....See (*A. J.* 349, 378)....Com (**X**)....Glasenapp (**IV**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)....Coleman (*Mem. R. A. S.* **LIII**)...A (3585, 3639)...Brown (3645)...Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I, II**)....Gl (*Mon. Not.* **LXI**, 556)....HΣ (**XII**)....Sk^5....Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

$32^m 14^s$ **6568.** **H 3341.** "It precedes the Cluster M 3, and was first noticed by Capt. Smythe as double while viewing that object in the 20-foot reflector." There is probably no change, although the measures of distance cover a wide range. It was readily seen (1876) with the 6-inch. In W^2 the magnitude is 9 m.

1842.47	193°.0	0″.6±	1*n*	Challis		
1848.42	196.9	0.8±	1*n*	Da	10	...10½
1880.01	191.2	1.83	3*n*	β	9.3...	9.5
1881.52	191.8	1.89	1*n*	Pt		
1903.65	191.4	2.16	4*n*	Doo		
1905.41	192.9	2.09	1*n*	β		

[Da^3...Flm...Pt...β^1...β^3...Doolittle (*Pub. Flower Obsy.* **II**)...β^6...]

32 17 **6569.** **H. C. Wilson 11.** The only measure is:

1898.3	66°.1	2″.27	1*n*	See

[Wilson (Cin^{10})...Innes (*Catalogue of Southern Doubles*, p. 312)...]

32 50 **6571.** **Σ 1769.** The principal star has considerable proper motion:

Stumpe	0″.262 in 241°.3
Porter	0.242 in 239.0

As there has been no relative change since the measures of Σ, this movement is common to all the components, and they form one system.

The following are all the measures since Struve:

A and B

1843.45	26°.2	3″.20	1*n*	Ma
1844.38	25.8	2.65	1*n*	Ma
1866.96	25.7	2.52	3*n*	Δ
1872.77	25.8	2.62	2*n*	Du
1885.38	26.4	2.57	3*n*	Per
1904.69	27.6	2.28	2*n*	β

A and C

1866.96	259°.1	55″.99	3*n*	Δ
1872.77	259.1	55.68	2*n*	Du
1885.38	259.0	56.21	3*n*	Per
1894.51	259.4	56.06	2*n*	Eng
1904.69	259.0	55.89	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Du...Δ (**II**)...Per...Per (2748)...Engelhardt (**III**)...β^6...]

6572. **β 934.** Discovered with the 18½-inch. In DM 9.4 m. It is $2^m 39^s$ *p* Σ 1774 *rej.* $32^m 50^s$

1891.31	266°.5	1″.26	3*n*	β
1902.32	263.8	1.21	5*n*	Doo
1905.49	268.1	1.03	2*n*	Doo

[β (**XIII**)...β^3...β (3114) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6573. **Σ 1770.** **B. A. C. 4556.** Fixed. 32 55

1870.53	120°.0	1″.88	5*n*	Δ
1894.60	122.1	1.87	2*n*	Gla
1905.49	118.6	1.90	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...H^1...H^2...Se...Da^1...Da^3...Du...OΣ (**IX**)...Δ (1185)...Δ (**I, II**)...Bl (**V**)...T (2898)...Per...Per (2748)...Glasenapp (**III**)...Knorre (3518)...]

(See p. 1075)

6576. **Hu 645.** With a later measure the mean is: 33 14

1903.44	20°.3	0″.84	2*n*	Hu	9.2...9.6

[Hu (*Bul. L. O.* No. 57)...]

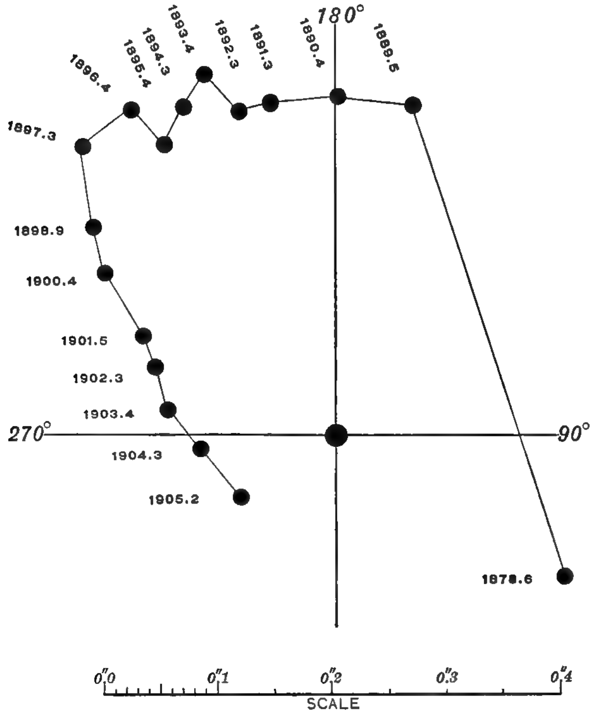
6577. **Σ 1771.** Without change. 33 32

1867.19	73°.4	1″.76	3*n*	Δ
1900.30	74.4	1.93	3*n*	Doo

[Ma (*F. S.* **I**, pp. 30, 146)...Ma (**XIII, XV**)...H (**V**)...Flm...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 22)...β^1...Doolittle (*Pub. Flower Obsy.* **I**)...Boeger (*A. J.* 522)...Biesbroeck...]

6578. **β 612.** **B. A. C. 4559.** Discovered with the 18½-inch. It was very soon apparent from the measures that this was a binary system in rapid motion. In the twenty-four years covered by the measures, the companion has passed over an arc of 240°. Glasenapp, from the measures down to and including 1892, has computed an orbit from which he finds a period of 30.00 years (*Astronomy and Astro-Physics*, June 1892). This represents the observations as well as could be desired, but evidently the arc at that time was too short for any very accurate determination. It is probable that with the measures of the next three or four years, the data will be 33 40 sufficient to give the elements of the orbit with considerable exactness.

The last seven positions shown on the diagram are from the measures of Aitken with the 36-inch refractor of the Lick Observatory.



β 612

1878.33	56°.1	0″.23	3*n*	β
1878.96	60.5	0.24	4*n*	Hl
1884.02	52.4	0.28	5*n*	En
1886.44	196.6	....	1*n*	HΣ
1889.46	166.8	0.3±	3*n*	Sp
1890.39	179.7	0.3±	2*n*	Sp
1891.28	191.1	0.28	3*n*	β
1891.44	191.1	0.32	3*n*	Hl
1891.49	186.1	0.2±	1*n*	Sp
1892.14	198.7	0.31	3*n*	β
1892.37	196.9	0.35	2*n*	HΣ
1892.40	194.6	0.25	3*n*	Sp
1893.42	207.4	0.36	1*n*	Wilson
1893.45	199.9	0.28	4*n*	Sp
1893.47	193.1	0.39	1*n*	Lewis
1894.12	207.4	0.32	4*n*	Barnard
1894.28	203.7	0.3±	2*n*	Com
1894.48	203.7	0.29	4*n*	Sp
1895.32	210.6	0.52	2*n*	Lewis
1895.40	209.3	0.30	2*n*	Sp
1895.42	212.1	0.25±	4*n*	Com
1896.37	212.5	0.4±	2*n*	Com
1896.41	212.1	0.34	2*n*	Lewis
1897.21	222.6	0.38	3*n*	A
1897.36	223.9	0.33	2*n*	Lewis
1897.42	217.3	0.30	6*n*	Sp
1898.32	210.9	0.48	1*n*	Bowyer
1898.40	221.0	0.39	2*n*	Lewis
1898.47	225°.1	0″.36	2*n*	Sp
1898.61	231.5	0.28	3*n*	A
1899.25	227.7	0.29	4*n*	A
1899.35	222.6	0.33	2*n*	Brown
1899.37	232.9	0.29	1*n*	See
1899.39	228.5	0.30	1*n*	Lewis
1899.40	215.1	0.41	1*n*	Bryant
1900.36	234.9	0.25	3*n*	A
1900.43	227.3	0.31	1*n*	Bryant
1901.35	237.0	0.36	2*n*	Doo
1901.39	230.4	0.30	1*n*	Bryant
1901.46	228.7	0.25	2*n*	Bowyer
1901.50	242.6	0.19	3*n*	A
1902.32	249.2	0.17	2*n*	A
1902.33	246.5	0.27	2*n*	Lewis
1903.36	246.0	0.26	2*n*	Lewis
1903.39	261.2	0.15	5*n*	A
1903.42	243.8	0.20	2*n*	Bowyer
1903.42	252.5	0.22	1*n*	Bryant
1904.27	275.8	0.12	1*n*	A
1905.20	302.6	0.10	3*n*	A

This is a naked-eye star in *Virgo*. It has no sensible proper motion.

[β (**X**)...β^1...β (3114, 3142)(*Pub. L. O.* **II**)...β (*Sid. Mess.* **X**, 323) (*Ast. and A.-P.* **XI**, 268)....Hl (I, II)....En (2678)....Sp (**III**)....Wilson (   )....Com (**X**)....Everett (*Mon. Not.* **LVI**, 464)....Glasenapp (*Ast. and A.-P.* **XI**. 466) ...Barnard (*A. J.* 447)...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 798)....Brown (3645)....Doolittle (*A. J.* 547)... A (3585, 3639)(*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XV**, 217)...Biesbroeck...] (See p. 1075)

6579. **Egbert** 2. Discovered by Egbert at Cincinnati 34^m :^{s} Looked for in 1901, and no such pair found in or near this place. About 2^m *f* a pair was measured, but the descriptions do not correspond (No. 6592).

[Cin^5...β^5...]

6580. **A. G. 191.** Double in *A. G. Lund.* Measures by β^6. 34 2

6581. **Ho 382.** (AC = **H 4604.**) The small star added by Hough. A and C both given in the *Argentine General Catalogue.* 34 4

A and B

1905.20	332°.9	14″.02	3*n*	Doo

A and C

1880.38	279°.0	15″.51	3*n*	Cin	8.3...10.5
1890.41	281.4	15.38	2*n*	Gla	8.0... 9.2
1891.38	281.0	15.30	1*n*	Ho	8.0...10.0
1905.20	280.5	15.95	3*n*	Doo	

[Ho (3234)...Cin^6...Glasenapp (I)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6582. **H 1238.** "Three more 10 m in the field." The only measure is the angle by Bigourdan, 305°.0 (1880.28) 1*n*. 34 16

6584. **H 4605.** "Has a neb. *f*." 34 28

1882.31	288°.6	18″.21	1*n*	Wilson	8.0...9.7

[Wilson (Cin^{10})...]

34$^{\rm m}$ 53$^{\rm s}$ **6585.** **H** 4606. In Lalande 6½ m, and 6-7 in O. Arg. S.; about 7 m, 1876.

1904.32	353°5	31″05	1*n*	β^6	6.0...9.3

34 57 **6586.** 1 *Bootis.* **Σ** 1772. (= **H** 534.) The change is very slow. The principal star has a proper motion of 0″074 in 285°6 (Auwers).

1865.40	144°0	4″70	3*n*	Δ
1889.44	143.0	4.83	2*n*	HΣ
1897.44	142.4	4.69	4*n*	Coleman
1903.26	141.2	4.81	2*n*	Biesbroeck

[Ma (*F. S.* I)....Ma (**XI, XIII**)....H^1....H (**V**)....Se....En (1674, 2663)....Ra (**XXII**) ... OΣ (**IX**) ... Δ (**II**)... Flm... Sp (**II**)...Per...Per (2748)...Sk^3... T (2991)...Big...Maw (**II**)... Coleman (*Mem. R. A. S.* **LIII, LIV**)... Bryant (*Mon. Not.* **LX,** 504)...HΣ (**XII**)...Thiele (3837)...Do (3930)...Biesbroeck...]

35 39 **6589.** **Σ** 1774 *rej.* The proper motion of A is given, 0″172 in 305°1 (*A. G. Harvard*); if this is correct, the companion has the same movement, as there has been no relative change. The only later measure is the following:

1901.34	133°9	17″85	2*n*	β	7.0...10.5

[β^3...β^5...]

35 39 **6590.** **Σ** 1773. No change in C, and perhaps none in B

		A and B		
1867.88	209°2	28″41	3*n*	Δ
1879.38	209.0	28.78	2*n*	Cin
1903.13	209.5	28.48	3*n*	β
		A and C		
1867.88	102°6	57″05	3*n*	Δ
1903.13	102.0	56.93	3*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^5...β^6...]

36 28 **6592.** Measured in looking for No. 6579, which could not be found.

[β^6...]

36 30 **6593.** **H** 1239. These are all the observations since Herschel:

1880.37	329°9	13″65	1*n*	Big	9.0...9.5
1903.15	336.6	13.57	2*n*	β^6	9.2...9.6

36 37 **6595.** **H** 2671. The only measures are:

1880.38	70°0	27″84	2*n*	Cin	9.0...9.8

[H (**VIII**)...Cin^6...]

36 51 **6597.** **Σ** 1776. Fixed.

1866.90	199°6	7″10	3*n*	Δ
1898.08	199.5	7.36	1*n*	Hu
1903.24	199.8	7.34	2*n*	Do

[Ma (**XI**)...H^1...H (**V**)...Wr...Se...Ra (**XXIII**)... Ba (**IV**)... Du... Δ (1207) ...Δ (**I, II**)...Sk^3...Big...*Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522) ...Sk^5...Do (3930)...]

37$^{\rm m}$ 3$^{\rm s}$ **6599.** 84 *Virginis.* **Σ** 1777. (= **H** II. 44 = **Sh** 374.) Very little change, but the stars have a common proper motion:

Auwers	0″340 in 259°5
Porter	0.334 in 258.0
Boss	0.319 in 256.1

1867.80	235°1	3″50	4*n*	Δ
1884.87	231.1	3.45	6*n*	Hl
1897.33	230.7	3.63	4*n*	Doo
1903.36	230.0	3.37	2*n*	Lewis

[Ma (*F. S.* **I,** pp. 54, 146)....Ma (324)....Ma (**X, XI, XIII, XV**)....H^1...H^2.... H (**IV**)...Se...Da^3...Da^4... Bp...Ra (**XXIV**)... Ba (**II**)...Mh...Hd...En (1674, 2663)....Flm....OΣ (**IX**)....Pl....WS....WS^2....Sk....ΘΣ (1125).... Δ (**I, II**)... Du... Do (*Trans. R. I. Acad.* **XXIX,** Part 13)...Do (2198, 2242, 3023)... Pt... Per... Per (2748)... Sp (2133)... Sp (**II**)... Hl (*Wash. Obsns.* 1884-85)... Hl (**I, II**)... Perry (*Eng. Mech.* **XXXVIII,** 192)...Lv^1...T (2898) ...Hayn (3051)...Jones (*A. J.* 312)...Maw (**II**)...Big...Big (*Bul. Ast.* **XII,** 299)...Giacomelli (**II**)...Com (**X**)...Knorre (3300)...Doolittle (*Pub. Flower Obsy.* **I**)...Glasenapp (**IV**)...Coleman (*Mem. R. A. S.* **LIII, LIV**)... *Annals Toulouse Obsy.* **III**....Greenwich Obsy. (*Mon. Not.* **LIV,** 316; **LIX,** 400; **LX,** 504; **LXIV,** 799)...]

6601. **Σ** 1775. **B. A. C.** 4571. Unchanged. 37 17

1867.66	335°2	27″48	3*n*	Δ
1879.25	334.7	27.51	1*n*	β
1898.17	335.5	27.59	3*n*	Doo

Doolittle measures a more distant star, 13.5 m:

1898.17	177°7	38″51	2*n*	Doo

[Ma (*F. S.* **II**)... Δ (**II**)... Cin^5 ... β^1 ... β^3 ... Glasenapp (**I**) ... Doolittle (*Pub. Flower Obsy.* **I**)...]

6604. **H** 2676. "MSS effaced so as to be nearly illegible." 38 12 Description found to be correct (1876). The principal star is given a proper motion of 0″080 in 90° (*A. G. Harvard*).

1901.34	125°5	29″66	2*n*	β	7.8...9.7

[Espin (3717)...β^5...]

6605. **H** 2674. The magnitude is 9.3 in SD. 38 28

1879.92	5°9	22″99	2*n*	Cin	8.0...9.0

[Cin^5...Cin^6...]

6606. **H** 1240. H (V) 291°0: 4″±: 11-12...13 (1830+). 38 33

6607. **Σ** 3081. Not seen in 1865 by Dembowski. Easily 38 46 seen with the 6-inch in 1875, and identified as here given. Later measures make the angle less, but show no motion.

1878.28	67°2	2″02	2*n*	β
1879.83	67.4	2.00	2*n*	Cin
1886.30	69.6	2.12	1*n*	Wilson
1901.47	67.9	2.16	2*n*	Hu

[Ma (*F. S.* **I**)... Flm... Cin^5...Cin^6... Wilson (Cin^{10})...β^1...]

6608. **H** 851. The magnitude in DM is 8.9. 38 55

1903.11	358°7	19″10	3*n*	β^6	8.2...11.5

38^{m} 56^{s} **6609.** **Σ 1779.** Fixed.

1869.93	146°9	3″76	5*n*	Δ
1905.07	146.0	4.03	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...β⁶...]

38 58 **6610.** **β 223.** Discovered with the 6-inch.

1880.33	344°7	18″75	1*n*	β
1889.37	344.7	18.56	2*n*	T
1899.07	344.3	18.98	1*n*	β
1901.34	344.0	18.70	3*n*	Doo

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...β³...Δ (**I**)...Cin⁵...T (3186)...Doolittle (*Pub. Flower Obsy.* **II**)...]

38 59 **6611.** **S 652.** A decided change in angle and distance, and evidently due to the proper motion of one of the stars.

1879.36	138°5	50″50	2*n*	Cin⁵	8.0...8.5
1903.17	134.0	48.71	3*n*	β⁶	7.9...7.9

39 7 **6612.** 85 *Virginis.* **H 2677.** The large star has a proper motion of 0″090 in 251°3 (*Greenwich 10-Year Catalogue*). The following are the only measures:

1879.33	311°8	43″26	2*n*	β³	6...11.7
1902.86	312.5	43.18	6*n*	β⁶	...12.0

39 20 **6614.** **Wn 5.** Discovered by Winnecke. The only later position is:

1897.37	161°5	4″03	3*n*	Doo

[Wn (1738)...Wn (**V**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

39 22 **6615.** **Σ 1782.** (= S 653.) Unchanged.

1867.03	185°6	29″85	3*n*	Δ
1902.18	185.3	29.69	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...β⁶...]

39 24 **6616.** **β 115.** Discovered with the 6-inch. There is an error in the declination given in β (III). The principal star has a proper motion of 0″132 in 213°9 (Bossert), and the companion is evidently moving with it. These are all the later measures:

1891.25	223°6	1″64	3*n*	β
1903.22	229.4	1.68	6*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 95)...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

39 29 **6617.** **H 2682.** C is O. Arg. N. 13953. The only measures are:

AB	1905.07	277°8	26″38	1*n*	β⁶	7.0...10.0
AC	1905.07	314.9	47.77	1*n*	β⁶	... 9.3

6618. 86 *Virginis.* **β 935.** (A and C = Σ 1780 *rej.*) Both components of Struve's rejected pair were found to be double with the 18½-inch. With a large aperture it is one of the finest of the quadruple groups. 39^{m} 33^{s}

According to Auwers, 86 *Virginis* has a proper motion of 0″043 in the direction of 287°5. The measures of AB show conclusively that this movement belongs to both stars. The observations are insufficient in point of time to show whether or not the double companion is moving with the principal star. All the other measures of AC are given.

In making the measures of 1889 with the 36-inch, two new nebulae were discovered in the vicinity. One is $4\frac{1}{2}^{s}$ *p* and 136′8 *s*, and the other $19\frac{1}{2}^{s}$ *p* and 101′6 *s*.

A and B

1879.50	293°5	1″61	5*n*	Hl
1881.44	296.1	1.33	2*n*	β
1885.38	290.3	1.70	2*n*	Hl
1889.30	299.6	1.66	3*n*	β
1897.40	293.8	1.52	3*n*	A
1899.20	297.9	1.63	3*n*	β

C and D

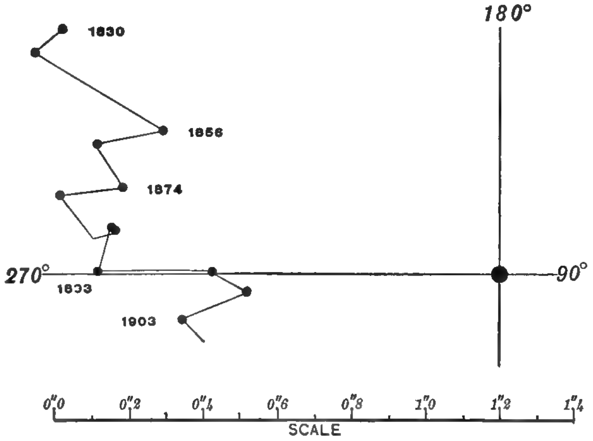
1879.50	276°1	1″80	2*n*	Hl
1889.30	275.9	2.24	3*n*	β
1897.40	270.6	2.09	3*n*	A
1899.20	273.7	2.03	2*n*	β

A and C (= Σ 1780 *rej.*)

1836.40	160°3	.....	1*n*	H
1889.30	164.6	27″17	3*n*	β
1899.20	164.3	27.07	3*n*	β

[β (**XIII**)...β³...β⁴...β (2930)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Cin⁶...Hl (**I, II**)...A (3465)...H (**VIII**)...]

6619. **Σ 1781.** Slow direct motion, but the measures disclose nothing as to its character. 40 6



Σ 1781

1830.31	240°4	1″36	3*n*	Σ
1841.91	244.2	1.40	2*n*	OΣ
1856.39	246.6	0.99	2*n*	Se
1864.75	251.8	1.15	3*n*	Δ
1874.42	256.8	1.05	3*n*	Δ
1875.37	259.5	1.21	4*n*	Sp

1879.90	263°.3	1″.05	6*n*	Hl
1885.35	262.8	1.06	3*n*	Hl
1893.85	269.4	1.09	4*n*	HΣ
1894.48	269.5	0.78	5*n*	Com
1898.08	274.0	0.69	1*n*	Hu
1903.46	277.8	0.87	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI**)... Bp... Se... Hd... Da³... Ba (**II**)...WS...WS²...Gl ....Δ (1185, 1188, 1572)....Δ (**I, II**)....OΣ (**IX**)....Sp (2133)....Sp (**II**).... Do (2198, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Hl (*Wash. Obsns.* 1884–85)... Hl (**I, II**)... Sk... En (1674, 2663)... Per... Per (2748)...T (2898) ....Flm....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXIV**, 799)... Maw (**II**)...Com (**X**)...Brown (3645)...*A. G. Leipzig*, p. 248...Coleman (*Mem. R. A. S.* **LIII**)...Glasenapp (**V**)...HΣ (**XII**)...Sk⁵...Biesbroeck...]

40m 27s **6622.** **H** 4613. "Very faint nebula near it *f.*" The nebula referred to is Dreyer 5292.

40 33 **6624.** **Ho** 383. The later measures show no change.

1903.34	163°.4	15″.89	3*n*	Doo

[Ho (3233)...]

40 43 **6625.** **β** 801. Discovered with the 15½-inch at the Washburn Observatory. The later measures show no motion.

1888.39	326°.5	2″.66	3*n*	Com
1898.37	324.3	2.62	3*n*	Doo
1903.34	327.0	2.41	1*n*	Lewis
1905.04	325.2	2.63	3*n*	Doo

[β (**XII**)...β⁴...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...Lewis (*Mon. Not.* **LXIV**, 799)...]

40 56 **6626.** **Σ** 1783. *Canum Ven.* 202. Fixed.

1868.23	51°.2	2″.12	3*n*	Δ
1905.14	49.2	2.17	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Du...Δ (**II**)...β⁶...]

41 35 **6630.** τ *Bootis.* **OΣ** 270. (= **H** 232.) A physical system, but with very little relative change thus far. The two stars have a large common proper motion:

Auwers	0″.495 in 274°.6
Newcomb	0.487 in 273.1

1867.36	348°.7	9″.03	3*n*	Δ
1873.64	350.8	8.91	4*n*	Δ
1878.31	351.9	8.71	4*n*	β
1881.47	354.3	8.90	3*n*	β
1883.41	352.4	8.89	6*n*	Hl
1891.40	353.6	8.72	2*n*	HΣ
1895.95	356.0	8.41	4*n*	Com
1898.26	355.1	8.45	3*n*	Hu
1901.14	355.8	8.66	3*n*	Doo

[OΣ (**IX**)...Da³...H (**I, V, VII**)...Mu...Flm...WS...Pt...Bru²...Per...Per (2685) ...En (2678)...Sadler (*Ast. Reg.* **XXIII**, 117)...Hl (**I, II**)...Hl (*Wash. Obsns.* 1882, 1884–85)...β¹...β³...β⁴...Big (*Bul. Ast.* **XII**, 299)...HΣ (**XII**)...Com (**X**) ... Hu (*Pub. L. O.* **V**) ... Do (3930) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

6632. **S** 654. (= **OΣ (App)** 125.) Unchanged. 41m 49s

1875.52	237°.4	71″.30	3*n*	Δ	5.2...8.2
1905.32	237.3	71.24	1*n*	β⁶	

[H (**IV, V**)...Δ (**I**)...Franz (3080)...β⁶...

6633. **Σ** 1787. No late measures, but probably unchanged. 42 7

1867.71	333°.2	2″.07	3*n*	Δ

[Ma (*F. S.* **I**)...Δ (**II**)...]

6634. **Σ** 1784. Probably fixed. 42 12

1868.40	207°.4	8″.61	4*n*	Δ
1878.30	208.7	9.00	1*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ...β¹...]

6635. **β** 413. The distant companion to this blood-red star was noted with the 6-inch. It is not likely to be of any interest as a double star. The color of the principal star is very striking. It is not given in any of the catalogues of red stars. The measures indicate a proper motion of 0″.07 nearly in the line of the components. 42 16

1877.37	109°.1	78″.68	1*n*	Cin	7.5...9.0
1879.33	108.8	78.00	1*n*	β	6.2...8.5
1885.32	108.7	77.77	1*n*	Wilson	7.0...8.0
1889.39	109.5	77.66	2*n*	β	7.7...9.2
1899.27	108.6	76.88	2*n*	β	8.0...9.0

[β (**VII**)...β (2103, 2957)...β³... β (*Pub. L. O.* **II**)...Cin⁴...Wilson (Cin¹⁰)...]

6641. **Σ** 1785. (= **Sh** 168.) Binary, the components having a large common proper motion. This is given from meridian positions: 43 38

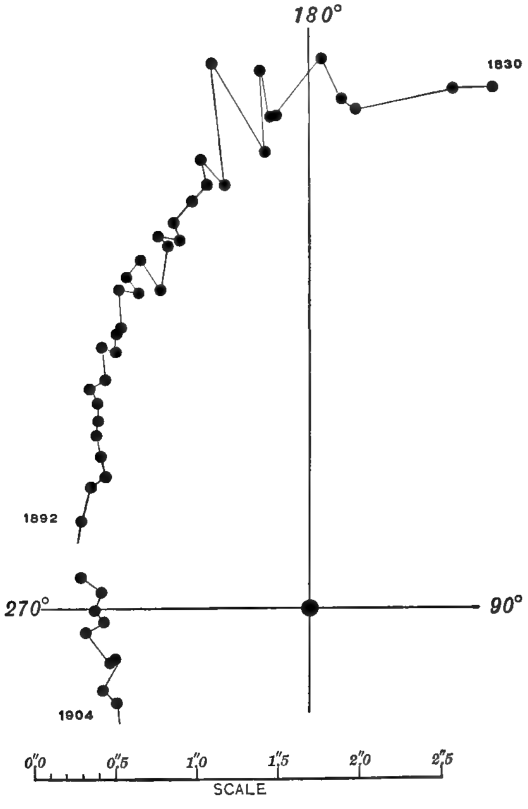
Porter	0″.476 in 262°.5
Kustner	0.455 in 257.3

In a paper on this system (*Monthly Notices*, LIII, 58, Dec. 1892) I have given all the measures of this pair to 1892, so far as published at that time, with a diagram showing the observed positions, commencing with Struve in 1830. This diagram is reproduced here, with some of the subsequent measures added thereto, as follows:

1895.52	259°.5	1″.47	2*n*	Com
1896.35	262.3	1.42	4*n*	Com
1897.55	265.6	1.29	3*n*	A
1898.08	270.8	1.32	1*n*	Hu
1899.36	273.5	1.27	4*n*	Gr. Obsy.
1900.44	276.0	1.38	2*n*	Bowyer
1901.43	285.0	1.26	2*n*	Bowyer
1902.40	284.5	1.23	4*n*	Gr. Obsy.
1903.38	291.6	1.36	2*n*	A
1904.26	296.3	1.31	4*n*	Biesbroeck

As the prior observations are given in chronological order in the paper referred to, it is not necessary to repeat them here.

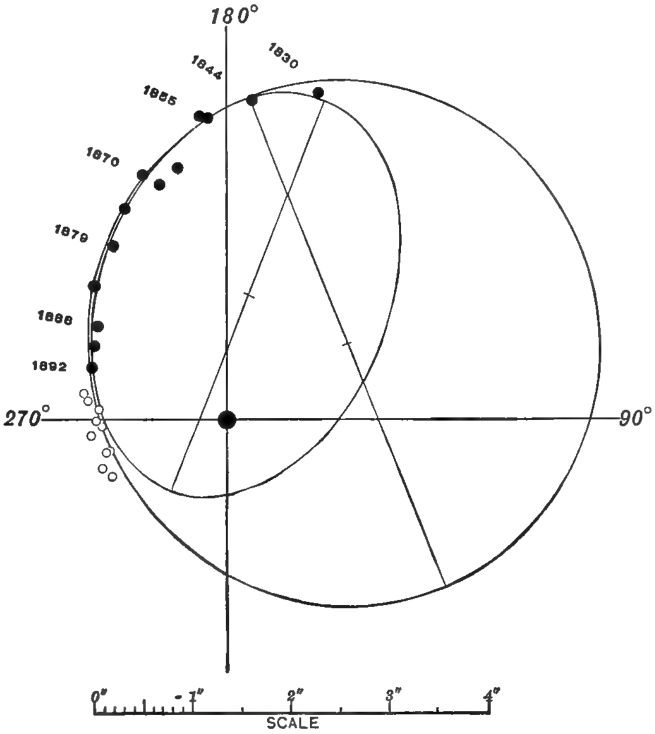
In a later paper on the same subject (*Astronomy and Astro-Physics*, XII, 397, May, 1893), after a more careful consideration of all the measures of this pair, it appeared that the elements of the orbit could not be determined, even approximately at this time, the observed arc being less than 90°, and therefore the observations could be equally well represented by apparent ellipses giving entirely different orbits. As an illustration of this uncertainty, the diagram, which is reproduced here, was given, showing two ellipses giving periods respectively of 130 and 300 years, which, so far as the measured positions were concerned, were practically identical. The same measures since 1892 are added to this in smaller white circles. It must be apparent that the position which the smaller star will occupy hereafter in the first and second quadrants is altogether problematical, and cannot be safely predicted from any material which is now available. Each successive orbit will necessarily differ materially from the prior investigations, and it will probably require the measures of a considerable part of the present century to reach a result which will be substantially correct.



Σ 1785

So far two orbits have been computed, each, of course, representing the measures employed with all desirable exactness, although reaching entirely different results, due to the additional material made use of in the later investigation. These results are:

1892	Gore	125.52 yrs.	*Mon. Not.* LIII, 333
1904	Biesbroeck	199.2	*An. Roy. Obsy. Belgique*, IX, 112



Σ 1785

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H¹...H²...H (**V**)...Wr...Se...Hd...Ra (**XXIII, XXXI**)...En (1518, 1674, 2663)...Du...Pl...OΣ (**IX, X**)...Δ (1185' 1474, 1572, 1735, 1798, 1886, 1979, 2079, 2193)...Δ (**I, II**)...Flm...Sp (2133)...Sp (**II, II** App)...Per...Per (2748)...Do (2198, 2316, 3930)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Kn...Gl...WS...WS²...Sk...Sk²...Sk³...Je (2449)...Hl (*Wash. Obsns.* 1883–86)...Hl (*A. J.* 269)...Hl (**I, II**)...T (2898)...Hayn (3051)....Ho (2978, 3234)....Jones (*A. J.* 312)....Gore (*Mon. Not.* **LIII**, 333) orbit....β (*Mon. Not.* **LIII**, 60) (*Ast. and A.-P.* **XII**, 397) ....β (3142)(*Pub. L. O.* **II**)...Maw (**II, III**)... Big... Big (*Bul. Ast.* **XII**, 299)...Sk⁴...Sk⁵...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)... Com (**X**)... Glasenapp (**III, IV, V**)... Giacomelli (**II**)... A (3465)... Brown (3645)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III** ....HΣ (**XII**)....Boeger (*A. J.* 522)....Lewis (*Observatory*, **XXV**, 269)....Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...] (See p. 1075)

6642. **β** 802. Discovered with the 15½-inch at the Washburn Observatory $43^m 48^s$

1885.54	220°.8	3″.73	3*n*	HΣ
1888.44	221.3	3.65	3*n*	Com
1903.00	221.4	3.46	3*n*	Doo

[β (**XII**)...β⁴...Com (**VI**)... HΣ (**XII**) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

43^m 54^s **6643. H 4617.** "An elegant double star." The distance in Cin^6 is 1″27. With a change of one revolution of the screw, the reduction would be 4″67. Probably fixed.

1883.36	260°8	5″09	1*n*	Wilson	8.0...9.5
1898.18	258.9	4.84	3*n*	Doo	
1903.46	260.0	5.02	2*n*	Scott	
1905.24	260.4	4.95	3*n*	Doo	

[Cin^6.... Wilson (Cin^{10}) .... See (3496) .... Doolittle (*Pub. Flower Obsy.* **I**) .... Scott (*Mon. Not.* **LXIV**, 52) ...]

44 21 **6644. H 852.** Nothing found in this place. There is certainly an error of 1° in the declination of H, making it identical with Σ 1786.

44 22 **6645. Σ 1786.** (= **H 852.**) Fixed. (See No. 6644.)

1867.32	22°9	10″76	4*n*	Δ
1905.05	22.3	10.81	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

44 39 **6646. S 655.** Declination in S about 7′ too small. The principal star has some proper motion:

A. G. Berlin	0″177 in 230°7
Bossert	0.188 in 217.2

The only later positions are:

1897.40	80°1	38″70	3*n*	Doo
1905.42	80.1	39.16	4*n*	Doo

[Doolittle (*Pub. Flower Obsy.* **I**) ...]

44 40 **6647.** S 656. (= **H VI. 89** = **H VI. 15** = **OΣ (App) 126.**) No change from the first (see No. 6648).

1876.33	208°4	85″79	3*n*	Δ	6.3...6.7
1892.87	208.3	85.85	4*n*	Franz	6.9...7.2
1904.31	208.5	85.60	2*n*	β	

[Δ (**I**) ... Glasenapp (**IV**) ... Franz (3464) ... β^6 ...]

45 **6648. H VI. 15.** Place doubtful in H. It must be the same as the last preceding pair, as I could find nothing else anywhere near this place.

45 8 **6649. β 343.** *Centauri* **219.** Discovered wiih the 6-inch. Apparently slow retrograde motion. In Gould 6.7 m. B. A. C. 4624.

1889.37	129°7	1″70	4*n*	β	6.2...7.1
1894.45	122.0	0.93	2*n*	Sellors	6 ...8
1897.22	123.0	1.05	3*n*	See	6.4...8.0
1898.32	118.7	1.28	3*n*	A	6.5...7.4
1903.46	120.7	1.02	3*n*	Scott	
1905.15	120.2	1.20	4*n*	Doo	

[β (**VI**) ... β (2062, 2957) (*Pub. L. O.* **II**) ... Cin^4 ... Sellors (3303) ... See (3496) ... A (3585) ... Scott (*Mon. Not.* **LXIV**, 52) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

6650. H 1243. "An elegant double star." Small stars, 10-11 m, and distance about 10″ (1877). In SD 9.4 m. 45^m 9^s

1904.11	155°5	10″76	2*n*	β^6	10.1...11.1

6653. See 189. The later measures give smaller distance. 45 26

1900.20	254°1	12″36	3*n*	Cogshall

[See (*A. J.* 413) ... Cogshall (*A. J.* 505) ...]

6654. H 2688. Nothing since Herschel but the following: 45 28

1879.28	278°9	22″65	1*n*	Cin^5

6655. Doolittle. From *Pub. Flower Obsy.* I. Error in place or magnitudes. There is no bright star here. 46

6656. β 613. Discovered with the 18½-inch. It is 12^{s}4 *f* the 6 m star, B. A. C. 4628. Change uncertain. All the later measures are given: 46 3

A and B

1880.37	149°3	0″92	1*n*	β
1892.13	149.7	0.73	3*n*	β
1898.43	153.6	0.48	1*n*	Lewis
1898.44	153.5	0.87	4*n*	Doo
1899.39	143.2	0.77	2*n*	Gr. Obsy.
1905.04	149.3	0.70	3*n*	Doo

AB and C

1892.15	83°2	48″75	2*n*	β
1898.44	82.1	48.73	4*n*	Doo

[β (**X**) ... β^1 ... β (3142) (*Pub. L. O.* **II**) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXIV**, 799) ... Doolittle (*Pub. Flower Obsy.* **I, II**) ...]

6657. Howe 28. (= **β 1108**; AD = **H V. 124.**) Discovered by Howe at Cincinnati. Later it was found independently, and included in my 16th catalogue. The 12 m star was added with the 36-inch. The apparent change in D may not be real. 46 32

1889.38	359°0	65″21	2*n*	β	...8.5

The only later positions of the close pair are:

1893.47	86°3	0″83	2*n*	Sellors	6...6
1897.37	86.5	0.99	3*n*	A	
1905.13	88.4	1.12	3*n*	Doo	

[Cin^4 ... β (2956) (*Pub. L. O.* **II**) ... Sellors (3240) ... A (3465) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

6659. See 190. Later measures are: 46 58

AB	1899.32	223°5	7″17	3*n*	Cg
AC	1899.32	143.0	30.95	3*n*	Cg

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

6661. Skinner 7. (= **Ku 46.**) Discovered by Skinner with the Meridian Circle of the Naval Observatory. 47 41

1902.46	109°0	2″60	3*n*	Ku	8.9.. 9.2
1904.35	113.7	2.03	1*n*	β	9.0...9.1

[Boeger (*A. J.* 522) ... Kustner (3821) ... β^6 ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

$47^m\ 56^s$ **6662.** 10 *Draconis.* **H** 3342. "Pretty difficult. A third star 60″ distant." The large star has a small proper motion:

Auwers	0″017 in 217°3
Davis	0.011 in 257.8

The only observations since Herschel are:

A and B

1879.30	25°7	56″30	1*n*	β	...13
1904.33	25.7	54.85	2*n*	β	...12

A and C

1879.30	65°0	90″90	1*n*	β	...11.8
1904.33	63.3	90.41	2*n*	β	...11.0

The distance in my measure of AC in 1879 was erroneously reduced; it should be as given above.

[β³...β⁶...Davis (*A. J.* 344)...]

48 2 **6663.** **β** 614. This very difficult pair was discovered with the 18½-inch. The principal star is identical with that of OΣ 271, which was marked "oblonga?" in the *Poulkowa Catalogue* of 1843, but rejected as single in the revised edition of 1850. It is not certain that the very minute star now measured has any connection with the suspected elongation previously noticed. At the time of making the measures with the 18½- and 36-inch refractors, the principal star was perfectly round. It is the southern star of three in the field.

This is always a difficult pair, and change is uncertain. The following are all the measures:

1878.37	268°3	0″60	2*n*	β	8.0...11.7
1889.40	271.1	0.44	3*n*	β	7.8...11.2
1900.00	251.6	0.38	3*n*	Hu	8.0...11.5
1900.68	258.2	0.46	3*n*	A	8.0...11.0
1903.84	246.8	0.32	2*n*	A	

[β (**X**)...β¹...β (2199, 2957) (*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...A (*Bul. L. O.* No. 11)...Ma (**XI, XIII**)...]

(See p. 1075)

48 3 **6664.** **OΣ (App)** 127. Groombridge 2060 and 2061. The following are all the measures, the first two being from meridian positions:

1844.3	68°0	71″18		O. Arg. N.
1846.6	67.8	71.30		Rad.
1876.38	66.2	74.11	3*n*	Δ
1883.34	65.9	74.85	4*n*	Franz
1903.13	65.2	76.46	3*n*	β

The proper motions are given:

A =	0″185 in 254°3	*Gr. 10-Year*
	0.191 in 248.2	Schroeter
	0.183 in 250.8	Porter
B =	0.095 in 270.	Schroeter
	0.086 in 270.	Porter

The above measures give for the most probable movement of A, the companion being considered as fixed:

0″111 in 212°3

[Δ (**I**)...Franz (2649)...β⁶...]

$48^m\ 20^s$ **6665.** **H** 1244. (= **Ho** 56.) "Fine." Lalande 25605. Probably unchanged.

1876.47	136°1	7″05	1*n*	OΣ	6.5...11.0
1883.44	131.1	6.74	2*n*	Ho	6.7...13
1903.35	130.3	6.65	3*n*	Doo	

[OΣ (**X**)...Ho (2778, 3558)...Espin (3717)...HΣ (**XII**)...]

48 41 **6668.** **Σ** 1788. (= **S** 657.) B. A. C. 4647. Slow direct motion in angle, with no sensible change in distance. These stars have a common proper motion, and therefore probably make a binary of long period.

Porter	0″215 in 266°3
Bossert	0.210 in 270.0

1844.34	60°6	2″49	2*n*	Ma
1852.24	64.9	2.66	2*n*	OΣ
1864.85	67.7	2.36	4*n*	Δ
1874.42	70.9	2.35	1*n*	Δ
1884.87	74.5	2.72	6*n*	Hl
1891.12	76.1	2.60	2*n*	Maw
1895.93	76.0	2.58	5*n*	Com
1903.44	78.2	2.83	6*n*	Jouffray
1905.38	77.4	2.80	5*n*	Doo

[Ma (*F. S.* **II**)...Ma (**XI, XV**)...H¹...H²...Se...Ra (**XXII**)...OΣ (**IX**)...Hd...En (1674, 2663)...Δ (1872)...Δ (**I, II**)...Flm...WS...WS²...Gl...Sk...Pt...Sp (2133)...Sp (**II**)...Per...Per (2748)...Lv¹...Cin⁴...Cin⁵...Wilson (Cin¹⁰)....Do (2198, 2303) (*Trans. R. I. Acad.* **XXIX**, Part 13)....T (2991, 3185)...Hayn (3051)...Hl (*Wash. Obsns.* 1884, 1885)...Hl (**I, II**) Jones (*A. J.* 312)...Glasenapp (**I**)...Maw (**I, III**)...Engelhardt (**II, III**)...Searle (*A. J.* 299)....Com (**X**)....Lehman (*Pub. A. S. P.* **IX**, 141)....Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Coleman (*Mem. R. A. S.* **LIII**)...Bryant (*Mon. Not.* **LX**, 504; **LXIV**, 799)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...Sk⁵...Jouffray (*Bul. Ast.* **XXI**, 299)...Biesbroeck...]

48 44 **6669.** **Σ** 1789. (= **Sh** 170.) Fixed.

1866.95	326°5	6″26	3*n*	Δ
1903.15	325.8	6.44	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Wr...Ra (**XXIII**)...Du...Per...Per (2748)...Δ (**II**)...Knorre (3518)...*Annals Toulouse Obsy.* **III**...]

48 58 **6670.** *η Bootis.* **Sh** 169. (= **H** VI. 95 = σ 447.) The large star has a proper motion of 0″351 in the direction of 191°4 (Auwers), which explains the change in the distant star. No measures by H. The following are all the measures since 1822:

1851.86	115°8	118″01	4*n*	OΣ	
1870.35	112.6	115.66	1*n*	OΣ	2.0...9.2
1879.30	110.9	114.62	2*n*	β	...9.0
1884.36	110.1	114.81	2*n*	HΣ	
1904.24	106.2	113.41	2*n*	β	

[OΣ (**X**)...β³...β⁶...]

49 1 **6671.** **OΣ** 272. Probably unchanged.

1843.33	22°2	1″52	2*n*	Ma
1868.99	18.6	1.83	6*n*	Δ
1884.38	17.8	1.80	2*n*	Per
1898.30	17.1	1.70	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Sk³...Per...Per (2685)...HΣ (**XII**)...Hu (*Pub. L. O.* **V**)...]

$49^m\ 11^s$ **6672.** **Ho 261.** Probably fixed.

1903.31	179°8	6″72	3*n*	Doo

[Ho (2977, 3558)...]

49 14 **6673.** **♅ N. 59.** Described by ♅ as an "unequal double." Found and identified; error of 4′ Decl. in ♅; estimated, 160°: 30″: 9...10 (1876). Recently measured:

1903.36	166°3	27″36	2*n*	β^6	8.3...9.0

49 52 **6674.** **Σ 1790.** No motion.

1867.63	241°4	5″36	3*n*	Δ
1893.35	241.7	5.17	1*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...Glasenapp (**II**)...]

50 5 **6675.** **See 193.** Discovered at the Lowell Observatory.

1899.97	163°8	6″19	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

50 19 **6676.** **OΣ 273.** Probably no sensible change. Pritchett measures a pair "near OΣ 273," 338°0 : 1″29 (1879.42) 1*n*; place and magnitudes not given.

1851.38	108°9	0″81	5*n*	Ma
1868.59	110.6	0.95	4*n*	Δ
1884.38	107.9	0.96	3*n*	Per
1887.38	108.5	0.71	2*n*	Hl
1898.27	110.7	0.95	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Se...Flm...Hd...Sk^2...Δ (**I**)...O. Stone (2201)... Pt ... En (2678) ... Do (2307, 3930) ... Per... Per (2685)... Hl (**II**)... Brown (3645)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

50 20 **6677.** **See 194.** (= **Innes 234.**) Later measures are:

1900.43	311°2	0″57	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...Innes (3462)...]

50 36 **6678.** **β 461.** Noted with the 6-inch.

A and B

1893.36	235°1	33″33	3*n*	Wilson
1899.37	235.9	33.12	2*n*	β

A and C

1893.36	216°6	40″50	3*n*	Wilson	...11.3
1899.37	216.6	40.84	2*n*	β	...12.3

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β^3...Wilson (   )...]

50 45 **6679.** **H 4637.** Probably fixed.

1880.01	137°4	13″08	3*n*	Cin	9.0...9.7
1904.22	139.0	13.38	2*n*	β	9.6...9.6

[Cin^5...Cin^6...β^6...]

6680. **Σ 1791.** No motion. $51^m\ 1^s$

1867.93	159°4	20″96	3*n*	Δ
1905.07	159.2	21.45	1*n*	β

[H (**V**)...Ma (*F. S.* **II**)...Δ (**II**)...β^1...*A. G. Leipzig*, p. 209...β^6...]

6681. **β 936.** Discovered with the 18½-inch. Probably fixed. 51 3

1892.13	95°8	4″58	3*n*	β
1898.51	95.9	4.66	3*n*	A
1901.33	97.4	4.54	3*n*	Doo
1905.31	97.1	4.29	3*n*	Doo

[β (**XIII**)...β^3...β (3142) (*Pub. L. O.* **II**) ... A (3585)... Doolittle (*Pub. Flower Obsy.* **II**)...]

6682. **H. C. Wilson 12.** (AC = **H 2692.**) Close star discovered by Wilson. There is an error in the first distance of AC by Wilson. The stars appear to be fixed. 51 10

A and B

1898.18	320°6	3″48	3*n*	Doo	9.4...10.2
1904.34	321.8	3.38	1*n*	β	9.8...10.3

A and C

1882.40	223°1	24″59	1*n*	W	
1886.38	223.6	29.81	1*n*	W	
1898.18	223.2	30.80	3*n*	Doo	... 9.5
1904.34	223.9	30.35	1*n*	β	...10.1

[Wilson (Cin^{10})...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

6683. **Σ 1792.** Probably unchanged. 51 12

1868.51	293°6	2″00	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^5...] (See p. 1075)

6687. **β 937.** Discovered with the 18½-inch. Very little, if any, change. 51 52

1890.48	108°8	0″77	2*n*	Sp
1896.49	102.8	0.88	3*n*	A
1905.04	105.2	0.88	4*n*	Doo

[β (**XIII**)...β^3...Sp (**III**)...A (3395)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6688. **β 344.** Discovered with the 6-inch. There is no evidence of change. 52 22

1880.33	124°4	3″31	2*n*	Cin	8.0...9.0
1898.32	123.8	3.44	3*n*	A	8.7...8.8
1901.35	119.7	3.55	4*n*	Doo	

[β (**VI**)....β (2062)... Cin^4... Cin^5... Cin^6...A (   ) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

6690. **β 30.** Discovered with the 6-inch. No motion. 52 26

1892.24	200°0	8″05	3*n*	β	8.0...10.4
1898.37	197.2	8.18	2*n*	Doo	8.0... 9.7
1903.37	200.1	8.57	3*n*	Lewis	

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....β (3142) (*Pub. L. O.* **II**)....Δ (**I**)....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Glasenapp (**V**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXIV**, 799)...]

$53^m\ 31^s$ **6692.** **H 4639.** Found (1877) as described by H.

53 35 **6693.** **Σ 1793.** *Bootis* 51. (= **S** 658.) Fixed.

1869.61	243°.1	4″.45	5*n*	Δ
1890.24	241.1	4.55	6*n*	Giacomelli

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Wr... Se... Ra (**XXIII**)... Du... Δ (1207)... Δ (**I, II**)... Nobile (*Rend. della R. Accad. Sci. Napoli*, Nov. 1875)... Per... T (2898)... Wellman (*Beob. Berlin* No. 6, 1892)... Glasenapp (**II, III**)... Giacomelli (**II**)... Ho (3234)... Knorre (3518)... *Annals Toulouse Obsy.* **III**...]

54 8 **6695.** **Σ 1794.** Without change.

1866.85	127°.7	1″.87	3*n*	Δ
1903.45	129.8	1.84	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Se... Δ (**II**)... Glasenapp (**II**)... Biesbroeck...]

54 31 **6696.** **Σ 1795.** Without change. The principal star is given a proper motion of 0″.054 in 119°.8 (*A. G. Harvard*).

1869.08	3°.3	7″.56	3*n*	Δ
1905.11	3.8	7.48	2*n*	β

[Bl (**V**)... Ma (*F. S.* **I**)... Δ (**II**)... β^3... β^6...]

54 50 **6697.** **H 4640.** "I think it is double, but the night is so very unsatisfactory that I cannot get a sharp glimpse." I could not see it double on one occasion in 1877, and the 40-inch in 1903 showed no companion of any kind. Probably not double.

55 16 **6699.** **Σ 1796.** Fixed.

1866.97	194°.8	2″.51	3*n*	Δ
1870.66	193.8	2.81	3*n*	Du

[Ma (*F. S.* **I, II**)... Ma (**XI, XIII, XV**)... Du... WS... Gl... Δ (**II**)...]

55 17 **6700.** **Σ 1798.** No material change.

1866.12	14°.3	7″.20	3*n*	Δ

[Ma (*F. S.* **I**)... Ma (**XIII**)... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (**II**)... Cin^5...]

55 33 **6701.** *τ Virginis.* **Sh 171.** (= **H̶ VI.** 77 = σ 450.) Probably unchanged. The large star has a proper motion of 0″.033 in 192°.8 (Auwers). The companion is DM (2°) 2760.

1782.97	.....	68″.37	1*n*	H̶	
1879.28	289°.6	79.57	1*n*	β	4...8.5
1893.51	290.0	79.77	2*n*	Big	
1904.16	289.8	79.68	3*n*	β	...8.9

[β^3... Big (*Bul. Ast.* **XII**, 299)... Cohn (3341)... β^6...]

56 4 **6703.** **β 1197.** Discovered with the 12-inch. There is some change in the angle and distance. These are all the later measures:

1897.37	187°.9	0″.93	3*n*	A
1897.42	185.2	1.18	1*n*	See
1904.36	192.5	1.40	2*n*	A
1905.17	192.5	1.06	4*n*	Doo

[β (**XVII**)... β (3047) (*Pub. L. O.* **II**)... A (3465)... See (3496)... Doolittle (*Pub. Flower Obsy.* **II**)...]

6705. **Σ 1797.** (= **H̶ N.** 82 = **Sh** 172.) Fixed. $56^m\ 18^s$

1869.22	159°.2	20″.97	5*n*	Δ

[H (**II**)... Δ (**II**)...]

6707. **H 2699.** There is a small star near B. 57 12

AB	1905.12	11°.7	27″.12	1*n*	β^6	
BC	1905.12	358.1	8.05	1*n*	β^6	13...13

6708. **Howe 29.** Discovered by Howe; only approximate place given. Identified and measured. 57 22

AB	1901.23	65°.2	0″.92	2*n*	β	9.0... 9.1
AC	1901.23	189.0	14.26	2*n*	β	...11.0

[Cin^5... Wilson (Cin^{10})... β^6...]

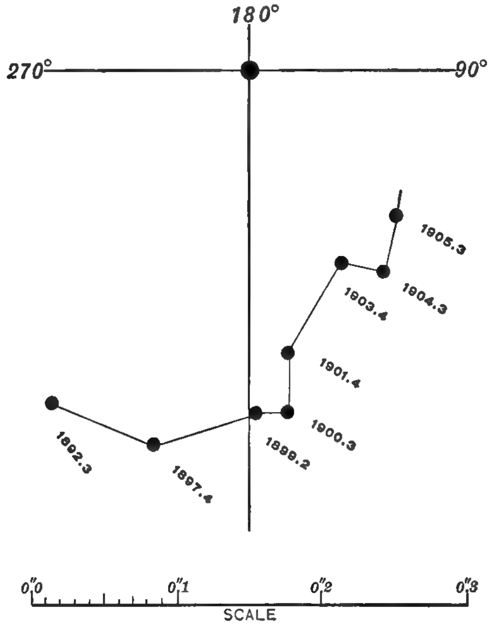
6709. **A. G. 192.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554). 57 39

6710. **Swift.** Discovered by Lewis Swift at the Warner Observatory in 1884. No motion. 57 40

1897.55	5°.5	2″.52	3*n*	A

[Swift (2683)... β (2957) (*Pub. L. O.* **II**)... A (3465)...]

6711. **β 1270.** Discovered with the 36-inch. In DM 7.9m. Binary, and probably of short period. It is a difficult pair at all times. 57 46



β 1270

1892.27*	329°.7	0″.27	3*n*	β
1896.40	356.2	0.43	1*n*	Lewis
897.41*	346.0	0.27	1*n*	Lewis
1898.44	341.8	0.36	2*n*	Lewis
1898.44	344.9	0.45	1*n*	Bowyer

1899.24*	1°5	0″24	3*n*	A
1899.43	334.3	....	1*n*	Lewis
1900.27*	6.8	0.24	4*n*	A
1901.39*	8.3	0.20	4*n*	A
1901.51	15.1	0.31	1*n*	Bowyer
1903.38	22.6	0.19	1*n*	Lewis
1903.42	23.5	0.15	1*n*	Bowyer
1903.42*	25.9	0.15	1*n*	A
1904.27*	33.9	0.17	1*n*	A
1905.30*	45.8	0.15	2*n*	A

[β (**XIX**) ...β (3141) (*Pub. L. O.* **II**) .... Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 504; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)... A (3639) (*Bul. L. O.* No. 11)...]

(See p. 1075)

58m 32s **6713.** **Σ 1799.** No cnange.

1867.30	294°2	3″99	3*n*	Δ
1889.36	294.1	4.01	2*n*	T

[Ma (*F. S.* **I**).... Ma (**XI**).... H^{1}.... Se.... Δ (**II**).... Cin^{5}.... Glasenapp (**I**).... T (3185)...]

59 3 **6714.** **S 659.** (= σ 451.) "Duplex" in O. Arg. S. 8 m. The following are all the observations:

1897.39	169°9	31″35	3*n*	Doo	8.0...9.0
1903.27	170.0	31.32	2*n*	β	7.3...7.5

[Doolittle (*Pub. Flower Obsy.* **I**)...β^{6}...]

59 21 **6715.** **Hu 646.** From *Bul. L. O.* No. 57.

59 27 **6716.** **Σ 1801.** Probably change in distance. Companion not seen by Dembowski in 1866.

1878.31	67°5	19″37	2*n*	β
1879.36	66.4	18.96	2*n*	Cin
1885.37	65.2	18.21	1*n*	Peters
1901.23	67.9	19.61	2*n*	β
1902.36	67.8	20.07	3*n*	Hu

[H (**IV, V**).... Δ (1736).... Peters (2676).... Cin^{5}.... Romberg (2689).... β^{1}.... β (*Mon. Not.* **XXXIV**, 393)...β^{5}...]

59 29 **6717.** **β 938.** Discovered with the 18½-inch. Probably unchanged. It is 6′ *n* of π *Hydrae.*

1892.40	117°1	0″65	3*n*	β
1892.41	299.1	0.62	3*n*	Lv
1897.42	111.5	0.72	1*n*	A
1901.33	118.7	0.76	3*n*	Doo
1905.48	111.8	0.81	1*n*	Doo

[β (**XIII**)...β^{3}...β (3142) (*Pub. L. O.* **II**)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...A (3465)... Doolittle (*Pub. Flower Obsy.* **II**)...]

59 30 **6718.** **Howe 30.** Discovered by Howe at the Cincinnati Observatory. Identified and measured:

1901.24	7°6	13″38	3*n*	β	8.2...8.7

[Cin^{5}...β^{5}...]

6719. **H 4650.** Large star only about 9 m (1877). The distant stars, C and D, added by Wilson. 0m 5s

A and B

1880.35	60°5	10″ ±	1*n*	Cin	9.0...12.0
1884.31	58.5	5 ±	1*n*	W	9.0... 9.5

[Cin^{6}... Wilson (Cin^{10})...]

6720. **H 1245.** "10″ *sp* by diagram; *np* by description. Double stars rare here." 0 18

6721. **H 2700.** Nothing later but the following: 0 48

1900.89	216°2	22″33	2*n*	Es	8.7...12.7

[Espin (*Mon. Not.* **LXII**, 532)...]

6722. **See 197.** No other measures. 1 2

[See (*A. J.* 431)...]

6723. **Σ 1803.** (= **H 537.**) *Yellow: pale blue,* H. No change. 1 24

1866.71	44°1	17″84	3*n*	Δ
1904.25	42.9	17.72	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**IV, V**)... Δ (**II**)...β^{1}...β^{6}...]

6724. **OΣ 274.** (= **H 538.**) Probably fixed. 1 31

1870.40	69°6	14″22	5*n*	Δ
1884.38	66.6	14.11	2*n*	Per
1886.42	67.2	14.04	2*n*	Hl
1898.30	65.9	13.99	5*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)... Cin^{5}... Δ (**II**)... Hl (*Wash. Obsns.* 1886)... Hl (**II**) ...Per...Per (2685)...Hu (*Pub. L. O.* **V**)... HΣ (**XII**)...]

6725. **Σ 1802.** Change probable. The principal star has a proper motion of 0″150 in 137°0 (Bossert). 1 35

1867.00	284°7	4″68	3*n*	Δ
1902.39	282.0	5.22	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Δ (**II**)... Cin^{5}... Glasenapp (**I**)... Bryant (*Mon. Not.* **LX**, 504)...]

6727. **Hn 16.** No sensible motion. 2 9

1899.44	216°8	2″88	3*n*	A
1901.30	217.4	2.52	1*n*	β

[β^{4}...Com (**VI**)...En (2678)...Jones (*A. J.* 312)..A (3639)...β^{6}...]

6729. **Σ 1804.** *Bootis* 76. (= **H N.** 115 = **S 660.**) Fixed. The larger star has a proper motion of 0″058 in 133°7 (*A. G. Berlin*). 2 39

1866.39	19°2	4″35	3*n*	Δ
1902.30	18.2	4.64	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X, XI**)... H^{1}... H^{2}... H (**V**)... Bp... Da^{3}... Se... Se^{2}... Ba (**II**)... Δ (1125)... Δ (**I, II**)... WS... WS^{2}... Gl... Flm... Per... Per (2748) ... Do (3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Pt ... Hl (*Wash. Obsns.* 1884)... Hl (**II**)... Big... Searle (*A. J.* 299)... Glasenapp (**IV**)...]

3^m 39^s **6730.** **H 2701.** "A fine double star."

1879.33	36°8	12″14	1*n*	Cin^5	8.0...8.0
1902.28	36.2	12.45	2*n*	Hu	8.8...9.5
1903.18	36.9	12.43	2*n*	β	8.6...9.5

[Cin^5...Hu (*Bul. L. O.* No. 44)...β^6...]

3 6 **6731.** **OΣ 276.** Change in AB is doubtful. The distant star, C, is fixed. Madler speaks of a faint star, 355° : 24″. The distance is probably a misprint, as I found it 356° : 144″ (1904.30).

A and B

1851.27	209°0	0″5 ±	2*n*	Ma
1869.37	194.3	Obl.	5*n*	Δ
1882.46	195.0	0.43	2*n*	Sp
1884.38	199.7	0.61	2*n*	Per
1887.41	200.4	0.48	2*n*	Hl
1898.32	199.8	0.62	3*n*	Hu

AB and C

1869.37	74°2	9″57	5*n*	Δ
1898.32	72.7	9.70	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Flm...Sp (**II**)...Pt...Per...Per (2685)...Δ (I)...Hl (**II**)...Hu (*Pub. L. O.* **V**)...]

3 14 **6732.** **OΣ 275.** Very little, if any, change.

1844.30	351°9	4″92	2*n*	Ma
1851.38	352.5	4.93	5*n*	Ma
1867.28	353.8	4.91	3*n*	Δ
1884.38	354.5	5.14	2*n*	Per
1898.25	353.0	5.28	3*n*	Hu

[Ma (**XI, XIII**)....OΣ (**IX**)....Δ (I)....Per....Per (2685)....Hd....Hu (*Pub. L. O.* **V**)....]

3 18 **6733.** **β 1109.** Discovered with the 36-inch.

A and B

1899.24	314°8	1″85	2*n*	A

A and C

1899.18	355°3	53″30	1*n*	A

[β (**XVI**)...β (2956) (*Pub. L. O.* **II**)...A (3639)...]

3 26 **6734.** **See 199.** Later measures:

1900.42	226°0	8″29	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

3 32 **6735.** **Hu 742.** The mean of this and two later measures is:

1904.51	175°6	0″40	3*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

3 48 **6736.** 13 *Bootis.* **H VI. 112.** (= σ 452.) The large star has a proper motion of 0″080 in 303°1 (Auwers). There is an error of 180° in the position-angles of H and Cin.

1879.33	95°0	83″47	1*n*	Cin^5	5.0...9.0
1902.22	274.3	81.06	2*n*	β	5.0...9.5

[Cin^5...Espin (*Mon. Not.* **LXII**, 532)...β^5...]

6737. **Σ 1805.** No material change. The measure in Ma (XV) appears to belong to Σ 1809. 3^m 55^s

1866.72	32°9	4″62	3*n*	Δ
1898.14	31.0	4.87	4*n*	Doo
1902.30	33.1	4.71	3*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI, XIII, XV**)....Se....H^2....Δ (**II**)....β^1....Glasenapp (**II, III**)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...]

6738. **Σ 1806.** Probably fixed. 4 13

1868.01	174°7	13″02	3*n*	Δ
1902.39	173.1	13.40	3*n*	Hu
1904.30	173.1	13.59	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XIII**)...H (**V**)...Δ (**II**)...WS...WS^2...β^6...]

6739. **Σ 1809.** Unchanged. 4 14

1868.24	197°5	4″44	3*n*	Δ
1905.14	195.8	4.33	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XV**) called Σ 1805...H (**V**)...Δ (**II**)...β^1...β^6...]

6740. **Hn 17.** Discovered at the Washburn Observatory. 4 16

1888.38	243°5	4″53	3*n*	Com
1899.27	243.5	4.70	2*n*	β
1904.99	243.9	4.54	3*n*	Doo

[β^4...Com (**VI**)...Jones (*A. J.* 312) called β 803...β (*Pub. Y. O.* **I**, p. 132)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6743. **See 200.** (= **See 203.**) Later measures are: 4 22

1899.97	95°4	9″80	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

6744. **H 540.** These are all the later observations: 4 26

1828.33	210°2	14″19 ±	1*n*	H	
1902.32	209.8	9.04		Espin	
1903.19	211.5	8.77	2*n*	β	8.5...8.9

[H^1...H (**V**)...Espin (*Mon. Not.* **LXII**, 532)...β^6...]

6745. **H 2703.** "Beautiful." If the angle in H is correct, there has been some change. 4 26

1897.39	10°3	7″96	3*n*	Doo
1905.14	8.0	7.85	1*n*	β

[Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

6746. **Σ 1808.** The measures are not very consistent, but probably fixed. Common proper motion, 0″195 in 255°1. 4 44

1869.09	73°6	2″69	4*n*	Δ
1885.41	73.1	2.75	2*n*	Per
1887.46	74.4	2.72	2*n*	Hl
1898.30	74.3	2.75	3*n*	Doo
1903.24	74.7	2.72	2*n*	Do

[Ma (*F.S.* **I**)...Ma (**XI**)...Du...Δ (**II**)...Flm...Sk^3...Do (2303, 3930)...Pt...Per....Per (2748)....Hl (**II**)....de Ball (2753)....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 504; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Coleman (*Mem. R A. S.* **LIII**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

$4^m\ 46^s$ **6747.** **β 803.** Discovered with the 15½-inch at the Washburn Observatory. Another pair found at the same place (Hn 17) is 30^s *p*.

1892.40	226°5	5″54	3*n*	β
1899.27	224.6	5.67	2*n*	β
1904.99	225.4	5.51	3*n*	Doo

[β (**XII**)...β^4...β (3142) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

5 6 **6748.** **Σ 1807.** (= **S 661.**) Fixed.

1866.02	28°5	7″11	3*n*	Δ
1881.33	28.8	7.21	3*n*	β
1901.25	27.4	6.88	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XII, XV**)...H^1...H (**IV**)...Bp...Ra (**XXIII**)...Se...Ba (**II**)...WS^2...Δ (**I, II**)...Cin^5...β^4...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...β^5...]

5 8 **6749.** **H 4661.** "Very neat." Rather pretty pair, but *p* star the smallest (1877). Double in *Cordoba Zones.*

1880.38	49°0	2″ ±	2*n*	Cin	
1883.36	232.5	4.40	1*n*	Wilson	9.0...9.3
1903.48	228.1	4.50	1*n*	Scott	

[Cin^6...Wilson (Cin^{10})...Scott (*Mon. Not.* **LXIV**, 52)...]

5 32 **6750.** **H 2702.** "The last of three in a line." This is substantially the place of the 9.8m star, SD (17°) 4026.

6 11 **6752.** **Σ 1810.** Probably unchanged.

1869.40	175°2	1″98	4*n*	Δ
1870.09	178.0	2.12	2*n*	Du
1886.44	176.2	2.09	3*n*	Per
1902.32	176.9	2.06	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...Du...Δ (**II**)...Per...Collins (*A. J.* 378)...Ho (3558)...Greenwich Obsy. (*Mon. Not.* **LX**, 505)...*Annals Toulouse Obsy.* **III**...]

6 12 **6753.** **H 3343.** The only measure is:

1905.16	213°6	62″64	1*n*	β^6

6 39 **6754.** **Σ 1814.** Fixed. The proper motion in *A. G. Harvard* is 0″379? in 270°.

1867.02	256°9	11″05	3*n*	Δ
1879.29	257.3	11.34	1*n*	β
1905.12	256.8	11.09	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...β^3...β^6...]

6 39 **6756.** **H 541.** "*White : bluish.* Very unequal." I failed to identify this on one occasion in 1903.

6758. **OΣ 277.** (AC = **Σ 1812** = **S 662.**) Close pair discovered by OΣ in 1842. Slow motion in angle. No sensible change in the distant star, C. $7^m\ 6^s$

1844.32	347°9	0″42	2*n*	Ma
1845.85	333.7	0.42	4*n*	OΣ
1856.44	342.7	0.4±	1*n*	Se
1865.42	334.4	0.47	3*n*	OΣ
1884.38	354.7	0.57	2*n*	Per
1888.65	352.3	0.38±	4*n*	HΣ
1896.49	354.6	0.81	3*n*	A
1898.44	356.7	0.44	5*n*	Hu
1904.23	360.4	0.42	3*n*	A

AB and C

1866.41	107°9	13″90	3*n*	Δ
1887.37	108.0	14.22	2*n*	Hl
1899.40	107.5	14.38	4*n*	Hu

[H (**II**)...Ma (**X, XI**)...Ma (*F. S.* **I**)...OΣ (**IX**)...Se...Δ (**I**, p. 229) (**II**)...Pl...Sk^3...Per...Per (2685, 2748)...Hl (**II**)...A (3395)...Hu (*Pub. L. O.* **V**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6759. **Σ 1811** *rej.* Measures from H (VII). The small star is SD (8°) 3723. The magnitudes in SD are, 8.6...10. 7 7

1902.43	328°1	36″12	2*n*	Hu	
1904.28	328.7	36.26	2*n*	β^6	8.4...9.0

6761. **Ho 57.** The following are all the other measures: 7 21

1893.53	204°1	2″38	2*n*	Ho
1903.57	211.2	2.20	4*n*	Doo

[Ho (2778, 3234)...]

6762. **Σ 1813.** (= **H N. 98** = **Sh 173.**) Later observers make the angle a little larger, but there is no evidence of motion. 7 24

1867.08	192°3	4″77	3*n*	Δ
1884.41	194.0	4.92	3*n*	Hl
1897.41	193.1	4.60	3*n*	Doo
1902.31	193.8	4.91	3*n*	Hu

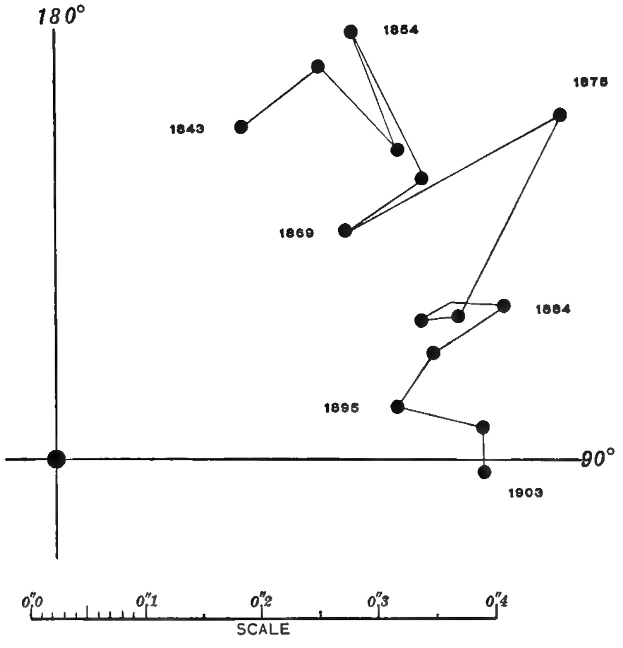
[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...H (**IV**)...Da^3...Se...En (1674)...Bp...Ra (**XXIII ?, XXXVIII, XXXIX**)...Ba (**II, IV**)...OΣ (**IX**)...Δ (*Mem. Accad. Sci.*)...Δ (1031)...Δ (**I, II**)...Du...Pl...Flm...WS...Gl...Sk^2...Sp (**II**)...Per...Per (2748)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Glasenapp (**II, III**)...Big...Maw (**II**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Do (3930)...Biesbroeck...]

6763. **OΣ 280.** Apparently fixed. 7 25

1844.32	26°2	6″94	2*n*	Ma
1852.69	24.9	7.15	1*n*	Ma
1866.80	24.3	6.95	3*n*	Δ
1897.39	22.9	7.33	4*n*	Doo
1898.45	21.8	7.28	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)..Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

7^m 31^s **6764.** **OΣ 278.** Very slow retrograde movement. There seems to be no sensible change in the distance. No inference as to the character of the relative motion can be drawn from the measures.



OΣ 278

Some of the positions are:

1843.44	150°.5	0″.33	2*n*	Ma
1846.03	146.0	0.41	3*n*	OΣ
1851.27	132.0	0.4±	1*n*	Ma
1854.00	145.1	0.45	2*n*	OΣ
1868.82	127.3	0.4±	5*n*	Δ
1869.48	128.3	0.32	3*n*	Du
1875.48	124.2	0.53	1*n*	OΣ
1877.40	109.6	0.37±	4*n*	Sp
1879.44	110.6	0.34	2*n*	Hl
1884.43	109.0	0.41	3*n*	Hl
1886.44	105.7	0.34	3*n*	Hl
1895.14	99.0	0.30	8*n*	Com
1898.30	94.4	0.37	3*n*	Hu
1903.49	88.5	0.37	2*n*	Biesbroeck

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Se . . . Du . . . Δ (**I**) . . . Flm . . . Sp (**II**) . . . Do (2316, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . . Hl (*Wash. Obsns.* 1884, 1886) . . . . Hl (**I, II**) . . . Com (**X**) . . . A (3585) . . . Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403) . . . . Brown (3645) . . . . Hu (*Pub. L. O.* **V**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . HΣ (**XII**) . . . Biesbroeck . . .]

7 34 **6765.** **H 4664.** In O. Arg. S. 8–9 m.

1880.39	14°.4	17″.74	2*n*	Cin	8.2 . . . 9.0

[Cin^5 . . . Cin^6 . . . Wilson (Cin^{10}) . . .]

6766. **β 224.** Discovered with the 6-inch. Change uncertain. 7^m 38^s

1879.47	61°.7	0″.95	2*n*	Sp
1884.98	68.6	0.78	5*n*	En
1893.36	65.0	0.88	3*n*	Wilson
1898.20	63.7	0.86	5*n*	Doo
1898.32	65.6	0.69	3*n*	A
1905.07	63.3	0.70	3*n*	Doo

[β (**IV**) . . . β (*Mon. Not.* **XXXIV**, 382) . . . Δ (**I**) . . . Sp (**II**) . . . En (2678) . . . Wilson ( ) . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . . A (3585) . . .]

6768. **β 939.** Discovered with the 18½-inch. Apparently without change. 7 48

A and B

1887.46	147.9	0.45	2*n*	Sp
1888.34	147.5	0.68	2*n*	Lv
1892.39	149.3	0.6±	2*n*	Sp
1898.27	147.5	0.71	3*n*	Doo
1905.03	141.0	0.65	3*n*	Doo

AB and C

1898.27	280°.0	87″.63	3*n*	Doo

[β (**XIII**) . . . β^3 . . . Sp (**III**) . . . Lv^1 . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . . Brown (3645) . . .]

6769. **Σ 1815.** Fixed. 7 56

1866.15	151°.6	8″.86	3*n*	Δ
1902.42	151.6	9.11	3*n*	Hu

[H^1 . . . H (**V**) . . . Ma (*F. S.* **II**) . . . Δ (**II**) . . . Cin^5 . . . Espin (*Mon. Not.* **LXIV**, 676) . . .]

6770. **OΣ 279.** No material change. 8 0

1867.64	251°.0	2″.08	4*n*	Δ
1898.28	252.8	2.13	4*n*	Hu

[Ma (**XI, XIII**) . . . Se . . . OΣ (**IX**) . . . Hd . . . Δ (**I**) . . . Sk^3 . . . β^3 . . . Maw (**II**) . . . Hu (*Pub. L. O.* **V**) . . . Do (3930) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

6771. **Σ 1822** *rej.* From *Catalogus Novus.* The only measure of this is: 8 13

1905.14	156°.1	11″.90	1*n*	β^6	8.8 . . . 10.3

The pair in H (V) observed for Σ 1822 *rej.* is DM (73°) 621, which is 1^m 57^s *f* and 10′ *n*. His observation and the later position are:

1830+	46°.7	14″±	1*n*	H	9–10 . . . 10–11
1905.14	47.5	15.13	1*n*	β	8.5 . . . 9.3

6772. **Σ 1816.** Fixed. 8 36

1870.10	82°.0	1″.57	5*n*	Δ
1896.49	79.0	1.66	2*n*	A
1902.36	80.8	1.71	3*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**X, XI**) . . . H^1 . . . H^2 . . . Da^1 . . . Da^3 . . . Bp . . . Se . . . Ba (**II**) . . . OΣ (**IX**) . . . Δ (1031) . . . Δ (**I, II**) . . . Δ (*Mem. Accad. Sci.*) . . . Sp (**II**) . . . WS . . . Gl . . . Du . . . Hayn (3051) . . . Per . . . Per (2748) . . . Sk^2 . . . Glasenapp (**II, III, V**) . . . Maw (**II, IV**) . . . A (3395) . . . Knorre (3518) . . . Greenwich Obsy. (*Mon. Not.* **LX**, 505) . . . . *Annals Toulouse Obsy.* **III** . . . . Sk^5 . . . . Boeger (*A. J.* 522) . . . . Do (3930) . . . Biesbroeck . . .]

$8^m\ 49^s$ **6773.** Σ 1817. *Bootis* 107. But little if any change

1867.38	4°9	1″40	3*n*	Δ
1902.42	1.1	1.13	3*n*	Hu

[Ma (**X, XI**)... Ma (*F. S.* **I**)... Du... Δ (**II**) ... Collins (*A. J.* 378)... Greenwich Obsy. (*Mon. Not.* **LX**, 505)...]

8 56 **6774.** **Ho** 58. Probably fixed.

1902.35	224°9	4″17	5*n*	Doo

[Ho (2778, 3558)...]

9 5 **6776.** Σ 1820. Slow angular motion. These stars have a common proper motion of 0″364 in 264°8 (Porter).

1854.38	63°1	2″35	1*n*	Ma
1868.61	61.3	2.11	4*n*	Δ
1871.45	63.2	2.27	5*n*	Du
1879.26	66.0	2.46	1*n*	β
1884.23	68.8	2.25	5*n*	Hl
1893.57	72.1	2.16	2*n*	Com
1898.36	75.6	2.35	4*n*	Doo
1902.42	76.5	2.25	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...Do (2307)...Flm...Du...OΣ (**IX**)...Δ (**II**)... Per...Per (2748)...Sk^3...Hl (*Wash. Obsns.* 1882, 1885)...Hl (**I, II**) ...β^1... β^3... Maw (**I, II**)... Big... Big (*Bul. Ast.* **XII**, 299)... Collins (*A. J.* 378)... Com (**X**)....Lv (*A. J.* 382)....Brown (3645)....Bryant (*Mon. Not.* **LX**, 505; **LXII**, 383)....HΣ (**XII**)....Sk^6...Doolittle (*Pub. Flower Obsy.* **I**)....Boeger (*A. J.* 522)...Biesbroeck...]

9 8 **6777.** Σ 1818. (= H 2705.) No change.

1866.74	328°4	5″42	3*n*	Δ
1902.42	327.9	5.53	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...]

9 11 **6778.** *κ Bootis.* Σ 1821. (= H III. 11 = **Sh** 174.) A small increase in the distance, and common proper motion.

Auwers	0″058 in 130°8
Bossert	0.130 in 80.1

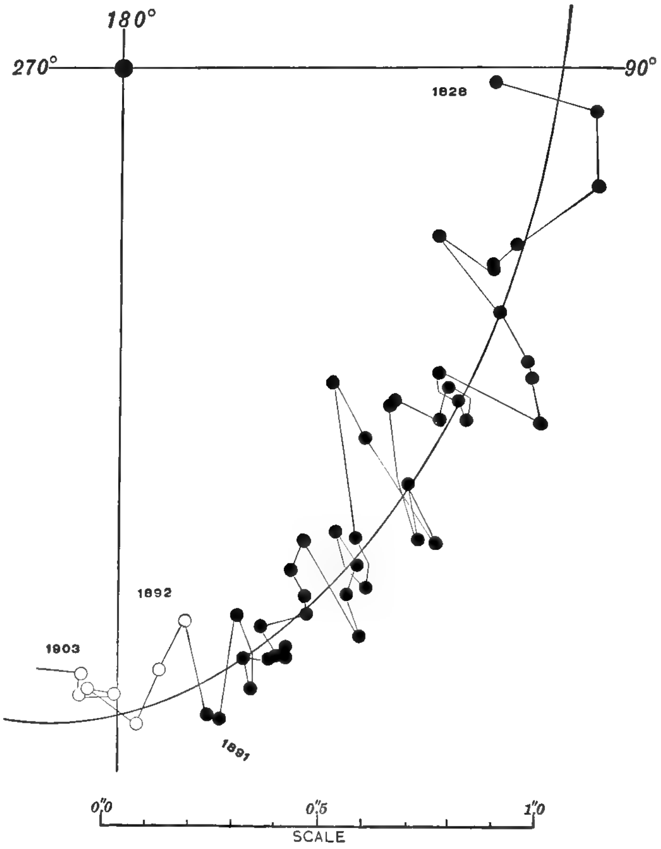
1867.74	237°5	12″81	4*n*	Δ
1885.41	236.7	12.96	2*n*	Per
1895.37	236.2	13.11	2*n*	Gla
1902.42	236.9	13.21	3*n*	Hu

[Ma (*Beiträge zur phys. Kennt. der himmlischen Körper*, Weimar, 1841)... Ma (*F. S.* **I**)... Ma (**IX, XI, XIII, XV**)... Σ^1... H^1... P^1...Wr... Ra (**XXII**)... Δ (*Mem. Accad. Sci.*)... Δ (1036, 1111)... Δ (**I, II**)... OΣ (**IX**)... Du... Flm ...WS^2... Sk^2... Pk...T (2898)... Per... Per (2748)...Big... Maw (**I**)...Je (2351).... Glasenapp (**III, IV**) .... Knorre (3518).... Espin (*Mon. Not.* **LXII**, 529)...]

9 18 **6780.** Σ 1819. Binary in slow retrograde motion. The total angular motion since Struve is about 90°. The system has a considerable proper motion. This is given from meridian observations:

Bossert	0″198 in 281°6
Boss	0.184 in 277.2

In a paper on this pair (*Monthly Notices R. A. S.* LXIII, 474), I have given all the measures to 1891 which were published at that time (June, 1893), with a diagram showing the mean result of the measures for each year when observations were made. As these measures, arranged in chronological order, are available for reference, they are not repeated here. The diagram referred to is reproduced here with some of the later measures added. These are shown by white circles, and are as follows:



Σ 1819

1892.52	7°0	1″30	4*n*	Com
1895.48	4.0	1.40	3*n*	Com
1898.42	1.8	1.52	6*n*	Doo
1899.43	357.3	1.44	2*n*	A
1900.47	359.7	1.45	2*n*	Maw
1902.43	356.6	1.46	2*n*	Hu
1903.32	356.6	1.41	3*n*	Biesbroeck

One orbit has been computed for this pair. Casey (*A. N.* 2421), from the measures to 1877, found a period of 340.1 years. It is evident from an inspection of the diagram that there is nothing in the measures to that time, nor in the measures to the present time, to warrant any conclusion as to the form of the apparent orbit. The arc is too short, and the errors of observation too large to give even the roughest approximation of the real path of the companion through the remaining portion of the ellipse. The period is not likely to be less than three or four hundred years, and may be very much longer.

[Ma (*F. S.* **I**)...Ma (**IX XI, XIII, XV**)...K (1519)...Bp...Se...Se^2...Se (*Comp. Rend.* **XLVIII**, 375)...Da^3...Hd...Ba (**II**)...OΣ (**IX**)...Δ (1111, 1185, 1474, 1735, 1886, 2193)...Δ (**I, II**)...Sk...Sk^2...Sk^3...Sk^4...Sk^5...WS...WS^2...Gl...Pl...Flm...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2092, 2198, 2242, 3023, 3930)...Sp (2133)...Sp (**I, II**) (**II** App)...Casey (2421, 2434)...Berberich (2518)...Ho (2978, 3558)...Thiele (2427)...Hl (*Wash. Obsns.* 1880-86)...Hl (*A. J.* 301)...Hl (**I, II**)...Per...Per (2748)...T (2898)...En (2663)...Glasenapp (**I**)....Jones (*A. J.* 312)....*Proc. Haverford Coll. Obsy.* 1891....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 505; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)....β (*Mon. Not.* **LIII**, 474)....Maw (**I, II, IV**)....Big (*Bul. Ast.* **XII**, 299)....Com (**X**)....Glasenapp (**IV**)....Brown (3645)....A (3639)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1075)

$9^m\ 50^s$ **6782.** **See 202.** Cogshall says, "wrongly identified by See. About 5^m west of this place," but exact place not given.

1899.43	109°.3	0″.86	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

9 57 **6783.** **Σ 1823.** Very recently, and since Part I was printed, Aitken has found with the 36-inch that the principal star of Σ 1823 is a very close pair:

A and B

1905.34	239°.2	0″.21	2*n*	A	9.0...9.5

The components have a large common proper motion:

Porter	0″.215 in 154°.5
Glasgow	0.265 in 146.7

The change in C is very slow:

AB and C

1843.37	152°.1	3″.42	2*n*	Ma
1866.97	150.7	3.43	3*n*	Δ
1880.48	151.9	3.60	3*n*	Sp
1889.44	149.9	3.57	2*n*	HΣ
1905.12	150.6	3.95	1*n*	β
1905.34	149.6	3.49	2*n*	A

The three stars doubtless form a triple system.

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...Se...Δ (**II**)...Sp (**II**)...Glasenapp (**IV**)...HΣ (**XII**)...β^6...A (*Pub. A. S. P.* **XVII**, 112)...]

(See No. 13264)

9 58 **6784.** **H 1248.** "The most minute double star I have hitherto seen." This is a little *s* of the 9.4 m star, DM (8°) 2834. The only measure is:

1901.36	163°.5	7″.94	2*n*	β^5	12.0...12.2

10 21 **6785.** **Σ 1824.** (= **ℌ N. 99.**) Fixed.

1866.70	281°.2	5″.28	3*n*	Δ
1905.12	283.5	5.27	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...Se...Δ (**II**)...β^6...]

10 22 **6786.** **ℌ N. 1.** The ℌ place is considerably in error. Identified and measured. It is 109^s *f* and 166″ *s* of DM (2°) 2794, giving the place as in Part I. The description in ℌ is, "Triple, Cl. III or IV, forming an equilateral triangle." The following is the only observation since 1784:

AB	1904.30	109°.3	18″.20	1*n*	β^6	10.0...10.5
AC	1904.30	150.4	26.17	1*n*	β^6	...10.3

6787. **H 1249.** "The large star is a fine red, between rose and garnet; it is rather a florid than a deep blood red." I found it only reddish (1877). Probably fixed. $10^m\ 25^s$

1830+	167°.7	6″±	1*n*	H	8-9...11
1882.32	168.1	4.94	2*n*	W	8.5...10.2
1902.29	165.2	5.04	2*n*	β	8.5 10.2
1905.34	162.9	4.94	5*n*	Doo	8.5...10.4

[H (**V**)...Cin^5...Wilson (Cin^{10})...β^6...

6788. **Σ 1827.** Without change. 10 32

1868.39	210°.0	10″.75	4*n*	Δ
1905.12	209.6	11.05	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...β^1...β^6...]

6789. **Σ 1826.** Unchanged. 10 39

1868.02	313°.8	4″.19	3*n*	Δ
1902.52	313.7	4.47	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Wr...Δ (**II**)...Du...Per...Per (2748)...]

6790. **Howe 31.** The measure in Cin^5 probably belongs to Howe 33 (No. 6798). "Double" in *Cordoba Zones.* 10 39

1885.32	75°.5	5″.92	1*n*	Wilson	8.5...9.0

[Cin^1...Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})...]

6791. **Howe 32.** Rough place in Cin^5. Identified and measured. 10 45

1903.11	194°.8	4″.68	2*n*	β^6	9.1...9.5

6794. **H 1250.** No change. 10 59

1873.39	6°.2	18″.72	1*n*	Δ	8.7... 9.2
1903.44	4.8	18.86	2*n*	β	8.7...10.0

[Δ (**I**)...β^6...]

6795. **Σ 1825.** *Bootis* **121.** Change in angle is probable. The distance in Struve seems to be too small. The proper motions are given in *A. G. Berlin*: 10 59

A = 0″.189 in 234°.5
B = 0.191 in 241.9

1841.52	184°.5	4″.05	2*n*	Ma
1868.24	178.5	3.84	6*n*	Δ
1877.94	175.9	3.99	4*n*	Sp
1879.42	176.2	4.08	3*n*	Hl
1884.42	175.2	4.16	3*n*	Hl
1893.46	173.7	3.98	3*n*	Maw
1902.54	172.7	4.11	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**IX, X, XI**)...H (**V**)...Se...WS...Gl...Flm...Do (2198, 2307) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Pl...Sk...Sp (**II**)...Ra (**XXXVIII**)...T (2866)...Δ (1572)...Δ (**II**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Glasenapp (**I**)...Maw (**II**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...HΣ (**XII**)...Thiele (3837)...Sk^5...Biesbroeck...]

6796. Found in looking for Howe 32 (No. 6791). At this time the latter was not seen, but was measured later 11 6

[β^5...] (See p. 1076)

11^{m} 6^{s} **6797.** **Σ 1829.** Fixed.

1869.77	150°4	5″10	5*n*	Δ
1902.51	150.1	5.39	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H¹...Ra (**XXIII**)...Du...Δ (1185)...Δ (**I, II**)...Per...Per (2748)...]

11 18 **6798.** **Howe 33.** Discovered by Howe at Cincinnati. The measure in Cin⁵ of Howe 31 (No. 6790), evidently belongs to this pair. "Double" in *Cordoba Zones.* No motion.

1903.45	119°1	3″20	2*n*	Scott

Innes (*Southern Double Stars*, pp. 130, 313) says See finds the larger component a close pair, 137° ± : 0″25 (1898.3), but not given in See's published measures.

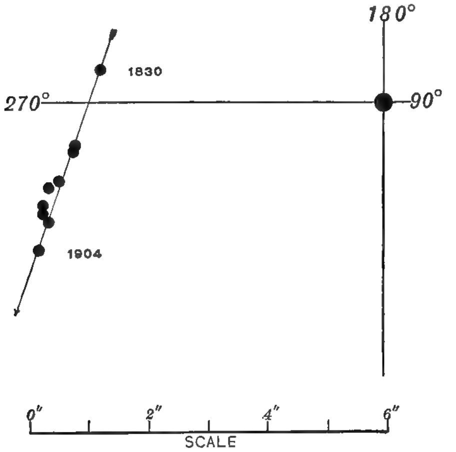
[Cin⁴...Cin⁵...Scott (*Mon. Not.* **LXIV**, 54)...]

11 30 **6799.** **Σ 1828.** Apparently fixed.

1868.13	163°9	1″88	3*n*	Δ
1905.43	162.5	1.79	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...β⁶...]

11 52 **6801.** **Σ 1830.** Change from proper motion. The measures of this and Σ 1831 in Ma (XIII, p. 28) are transposed. There is a faint star closely *f.*



Σ 1830

1830.89	264°0	4″84	3*n*	Σ
1860.06	278.2	5.31	2*n*	Se
1866.87	279.3	5.36	3*n*	Δ
1873.62	283.8	5.68	2*n*	OΣ
1878.45	284.3	5.86	2*n*	Δ
1879.45	285.0	5.93	3*n*	Hl
1885.43	287.1	6.05	3*n*	Hl
1893.72	288.4	6.08	3*n*	Maw
1896.41	289.8	6.02	1*n*	Com
1904.36	293.3	6.36	2*n*	β

For two more distant stars:

A and C

1886.52	81°6	35″87	2*n*	Eng	...12.8
1904.38	81.4	35.43	1*n*	β	

A and D

1872.05	60°9	143″24	5*n*	Δ	... 5.8
1878.18	61.0	142.58	2*n*	OΣ	
1886.60	61.3	142.33	5*n*	Eng	... 5.6
1904.38	61.6	141.73	1*n*	β	

[Ma (*F. S.* **I**).... Ma (**XIII, XV**).... Se.... Du....Do (2316, 3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)....OΣ (**IX**) (X, pp. 28, 169).... Δ (2194).... Δ (**II**).... WS...Gl...Sk...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Big...Searle (*A. J.* 299)...Per...Per (2748)...Engelhardt (2785)...Maw (**II**)...Engelhardt (**II**)....Collins (*A. J.* 378)....Com (**X**)....Glasenapp (**V**)....HΣ (**XII**)....Sk⁵....Espin (*Mon. Not.* **LXIV**, 676)...β⁶...]

6802. *ι Bootis.* **Σ 26, App. I.** (= **H V. 9** = **Sh 175** = **Σ 3124** *rej.* = **OΣ** (**App**) **128.**) Struve thought the large star was an excessively close pair in the direction of 150° to 170°, but the apparent elongation was undoubtedly an illusion, as this star has always been found single since with the largest apertures. There is no change in the 7.5 m star. These stars have a common proper motion: 11^{m} 56^{s}

Auwers	0″170 in 300°0
Bossert	0.181 in 299.8

1867.04	33°2	38″24	4*n*	Δ
1877.39	32.9	38.39	6*n*	Hl
1886.63	33.5	38.21	2*n*	Eng
1899.80	33.1	38.64	1*n*	Hu

[Ma (*F. S.* **II**) as Σ 3124...Se¹...Da³...Ra (**XXII, XXV**)...Δ (1736)...Δ (**II**)...Du...Flm...Pk...OΣ (**X**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Franz (2649)...En (2662)...Big...Je (2340)...Engelhardt (**II**)...Hl (**I**, p. 18)...β⁴...Glasenapp (**III, IV**)...Espin (*Mon. Not.* **LXII**, 532)...Hu (*Bul. L. O.* No. 44)...]

6803. **β 1246.** Discovered with the 36-inch. The principal star has a large proper motion, 0″458 in the direction of 307°0 (Porter). The change in the position of C is explained by this motion of A. The companion to A evidently has the same proper motion, and the two doubtless form a physical system. Lacaille 5892. 12 12

A and B

1898.52	189°2	3″30	2*n*	A

A and C

1898.44	92°0	39″09	1*n*	β
1898.52	93.0	39.05	2*n*	A

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...A (3585)...] (See p. 1076)

6804. **Σ 1831.** No change since the first measures. There is a bright star nearly midway between this pair and Σ 1830, which OΣ thought might be variable. He calls it 6.0 m, and Δ 5.8 m. Some other observers have rated it much smaller. The difference is probably due to errors in the estimates. 12 17

1866.55	141°8	5″86	3*n*	Δ
1878.45	139.5	5.79	2*n*	Δ
1885.43	140.3	5.98	3*n*	Hl
1904.37	141.3	5.95	2*n*	β

A and C

1872.05	227°4	104″98	5*n*	Δ
1878.18	226.9	105.08	2*n*	OΣ
1886.60	226.6	105.41	5*n*	Eng
1904.37	225.3	105.96	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII, XV**) . . . H (**V**) . . . Se . . . Du . . . WS . . . WS2 . . . Do (3023) (*Trans. R. I. Acad.* **XXIX** Part 13) . . . Δ (**II**) . . . Δ (2194) . . . OΣ (**IX**) (**X**, pp. 29, 169) . . . Hl (**I, II**) . . . Per . . . Per (2748) . . . Engelhardt (2785) (**II**) . . . Maw (**II**) . . . Collins (*A. J.* 378) . . . Com (**X**) . . . Glasenapp (**V**) . . . Espin (*Mon. Not.* **LXIV**, 676) . . . β6 . . .]

$12^{m}\,29^{s}$ **6805.** **β** 1110. Discovered with the 12-inch. So far unchanged.

1897.37	133°.4	3″.52	1*n*	See	
1898.52	131.2	3.78	3*n*	A	7.2 . . . 11.7
1901.34	128.4	4.00	3*n*	Doo	

[β (**XVI**) . . . β (2956) (*Pub. L. O.* **II**) . . . See (3496) . . . A (3585) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

12 46 **6807.** **A** 147. No other measures.

[A (3741) (*Bul. L. O.* No. 3) . . .]

12 48 **6808.** **Hn** 18. Discovered at the Washburn Observatory.

1888.38	356°.6	3″.82	1*n*	Com
1905.17	355.4	3.60	3*n*	Doo

[β4 . . . Com (**VI**) . . .]

12 51 **6810.** **Σ** 1832. (AC = **H** 1251.) The faint star is not in Σ. The only measures since H are:

1878.32	69°.6	19″.16	1*n*	β	
1903.40	72.3	20.18	2*n*	Lewis	
1905.43	67.9	20.34	1*n*	β	. . . 13

The later observations of the close pair give a larger angle, but do not indicate any sensible change.

1844.32	134°.4	0″.6 ±	3*n*	Ma
1850.06	128.9	0.58	3*n*	OΣ
1851.35	132.3	. . . .	1*n*	Ma
1856.41	120.6	0.41	2*n*	Se
1878.32	131.4	0.65	1*n*	β
1886.37	129.0	0.75	1*n*	Per
1888.91	128.4	0.72	2*n*	HΣ
1903.40	135.4	0.61	2*n*	Lewis

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Hd . . . Sp (**II**) . . . WS2 . . . Sk2 . . . Δ (1736) . . . Se . . . Per . . . Per (2748) . . . β1 . . . Lewis (*Mon. Not.* **LX**, 505; **LXIV**, 799) . . . HΣ (**XII**) . . . β6 . . .]

13 3 **6811.** **β** 116. Discovered with the 6-inch. No material change. It is 20′ *s* of λ *Virginis*. Some of the later positions are:

1878.42	277°.4	2″.98	2*n*	Cin
1888.36	98.6	3.16	3*n*	T
1888.36	277.7	3.01	2*n*	Lv
1890.41	279.1	3.32	2*n*	Gla
1893.38	276.5	3.08	1*n*	Jones
1901.35	276.9	3.15	4*n*	Doo

[β (**III**) . . . β (*Mon. Not.* **XXXIV**, 59) . . . Δ (**I**) . . . Cin3 . . . Cin4 . . . Cin5 . . . Cin6 . . . Wilson (Cin10) . . . LM . . . Lv1 . . . T (2991) . . . Glasenapp (**I**) . . . Jones (*A. J.* 312) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

13 4 **6812.** **β** 1271. Discovered with the 36-inch. In DM 7.0 m.

1897.58	351°.0	2″.31	3*n*	A	7.0 . . . 12.0
1901.72	350.4	2.80	4*n*	Doo	

[β (**XIX**) . . . β (3141) (*Pub. L. O.* **II**) . . . A (3465) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

6813. **β** 1272. (AC = **H** 2710.) The duplicity of the principal star of H 2710 was discovered with the 36-inch. Thus far there appears to be no certain change, and the same is true of the distant star. C is O. Arg. N. 14448. $13^{m}\,22^{s}$

A and B

1897.52	132°.8	1″.32	2*n*	Lewis
1897.56	126.5	1.14	3*n*	A
1899.55	131.2	1.24	2*n*	Bryant
1901.45	136.1	1.31	3*n*	Lewis
1902.57	133.3	1.30	5*n*	Doo

A and C (= H 2710)

1830	324°.0	25″ ±	1*n*	H
1898.63	321.4	23.60	1*n*	Bryant
1901.34	321.2	23.34	3*n*	Doo

[β (**XIX**) . . . . β (3141) (*Pub. L. O.* **II**) . . . . A (3465) . . . . Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383) . . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . .]

6815. **H** 2708. Bigourdan mentions a third star 12.5 m *f*. 13 37

1880.41	134°.0	23″.42	1*n*	Big	10 . . . 10

6817. **β** 1273. Discovered with the 36-inch. Probably unchanged. 14 2

1897.52	193°.3	0″.94	2*n*	Lewis
1897.56	187.1	1.08	3*n*	A
1898.53	199.4	0.80	1*n*	Lewis
1899.55	192.8	1.02	2*n*	Bryant
1901.09	185.5	1.08	3*n*	Lewis
1903.65	188.4	1.14	5*n*	Doo

[β (**XIX**) . . . . β (3141) (*Pub. L. O.* **II**) . . . . A (3465) . . . . Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383) . . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . .]

6818. **Σ** 3083. Fixed. 14 12

1868.90	231°.6	4″.81	4*n*	Δ
1878.34	230.7	4.48	1*n*	β

[Δ (**II**) . . . Cin5 . . . β1 . . .] (See p. 1076)

6819. **H** 1252. H (V), 9 . . . 13-14. Apparently unchanged (1877). 14 22

1903.73	269°.6	12″.16	3*n*	β6	8.6 . . . 10.7

6820. **OΣ** 281. Some of the measures are conflicting, but probably without change. 14 26

1843.30	150°.9	1″.07	2*n*	Ma
1851.39	148.8	0.97	2*n*	Ma
1868.81	153.4	1.55	4*n*	Δ
1886.41	158.2	1.50	3*n*	Hl
1898.34	161.6	1.49	4*n*	Hu
1901.14	161.6	1.60	3*n*	Doo

[Ma (**XI, XIII**) . . . . OΣ (**IX**) . . . . Δ (**I**) . . . . Se . . . . Hd . . . . Hl (*Wash. Obsns.* 1886) . . . . Hl (**II**) . . . Per . . . Per (2685) . . . Glasenapp (**IV**) . . . Brown (3645) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

$14^m\ 29^s$ **6821.** **A. G. 193.** Double in *A. G. Bonn.* Measures by Espin (3717).

14 38 **6822.** **A. G. 194.** "Dupl.?" in *A. G. Berlin.* Examined by Miller (*A. J.* 546) in 1902, and noted as "double, but too close to measure."

14 40 **6823.** **H 546.** "Third class. *Red : blue;* very pretty." There is nothing of this kind here. The R. A. in H is 4^m too small, and the declination about 1° farther south. (See No. 6858.)

14 51 **6824.** **Ho 541.** The only later position is:

1902.34	91°0	2″18	4*n*	Doo

[Ho (3557)...]

15 42 **6828.** **Ho 384.** Distance increasing, probably from proper motion. The later measures are:

1896.90	49°7	26″44	2*n*	Ho
1904.04	49.8	27.87	5*n*	Doo

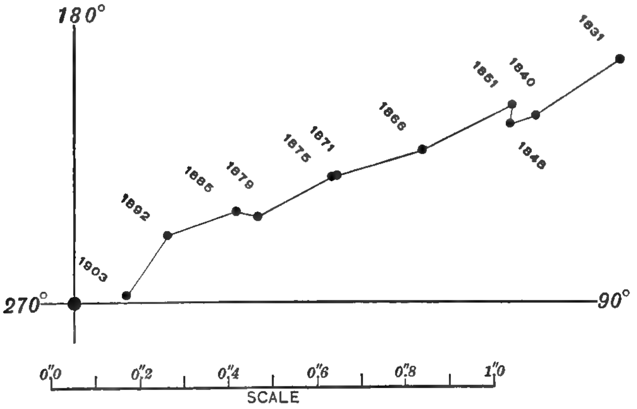
The large star should have a proper motion of about 0″16 in 230°.

[Ho (3233, 3558)...]

15 53 **6831.** **H 2711.** Nothing later but this:

1884.64	131°5	14″07	2*n*	Wilson (Cin^{10})	8.7...11.5

15 54 **6832.** **Σ 1834.** Since the first measures by Struve, the companion has been approaching the principal star at an apparently uniform rate until it is now single with the largest telescopes. The measures seem to indicate nothing but proper motion. If a binary, the plane of the orbit must almost exactly be in the line of sight. In either case it should be measurable again in a very few years.



Σ 1834

1831.20	113°7	1″36	4*n*	Σ
1840.54	111.8	1.13	3*n*	Da
1848.86	112.1	1.07	2*n*	Da
1851.78	113.9	1.09	4*n*	OΣ
1866.31	113.3	0.86	3*n*	Δ
1871.21	115.5	0.66	4*n*	Du
1875.48	115.6	0.65	1*n*	OΣ
1879.47	114.8	0.46	3*n*	Hl
1885.53	118.6	0.42	3*n*	Hl
1892.17	125.1	0.26	2*n*	β
1893.58	113.6	0.25±	1*n*	Com
1899.39	270±	0.2±	1*n*	Brown
1903.60	96.3	0.12	1*n*	A
1904.34	Round with 36-inch			Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H^2...H (**V**)...Bp...Da^3...Ba (**II**)...Δ (1207)...Δ (**I, II**)...Du...OΣ (**IX, X**)...Flm...WS...Se...Gl...Sk^2...Sk^3...Big...Hl (*Wash. Obsns.* 1885)....Hl (**I, II**)....En (2663)....Pt....Greenwich Obsy. (*Mon. Not.* **LIV**, 316; **LIX**, 400; **LX**, 505; **LXII**, 383; **LXIII**, 403)...β (3142) (*Pub. L. O.* **II**)...Com (**X**)...Brown (3645)...Biesbroeck...}

6833. **♅ III. 20.** "Identification very precarious from vagueness of description." There is but little doubt of this being Σ 1838 (No. 6852). $16^m\ :^s$

6836. **Espin 19.** Discovered by Espin. Measures by β^5. 16 15

[Espin (3717) (*Mon. Not.* **LXII**, 532)...]

6837. **Σ 1833.** (= **Sh 176.**) **B. A. C. 4764.** The components have a common proper motion: 16 18

Bossert	0″120 in 180°0
Rad^3.	0.171 in 185.0

There is no material change, unless a small increase in distance.

1866.75	167°3	5″14	3*n*	Δ
1890.00	169.0	5.27	5*n*	Giacomelli
1904.37	170.0	5.52	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII, VIII**)...Se...Bp...Ra (**XXII**)...Ba (**II**)...WS^2...Du...Δ (1207)...Δ (**I, II**)...Cin^5...Cin^6...Wilson (Cin^{10})...Per...Per (2748)....Glasenapp (**I, III**)....T (3185)....Ho (3234, 3558)....Giacomelli (**II**)...Knorre (3518)...*Annals Toulouse Obsy.* **III**...]

6840. **H 2714.** (= **Ho 385.**) "Difficult; requires illumination, or the eye must be turned aside." Easy with 6-inch (1874). The large star has a proper motion of 0″033 in 154°7 (Battermann). 17 18

1879.33	276°1	20″03	1*n*	β^3	7.5...11.8
1891.91	277.0	22.61	1*n*	Ho	7.2...11.2
1897.41	277.3	23.23	3*n*	Doo	
1901.27	279.2	23.07	2*n*	β	
1903.25	279.1	23.44	4*n*	β	7.6...10.2

[β^3...Ho (3233)...Doolittle (*Pub. Flower Obsy.* **I**)...β^5...β^6...]

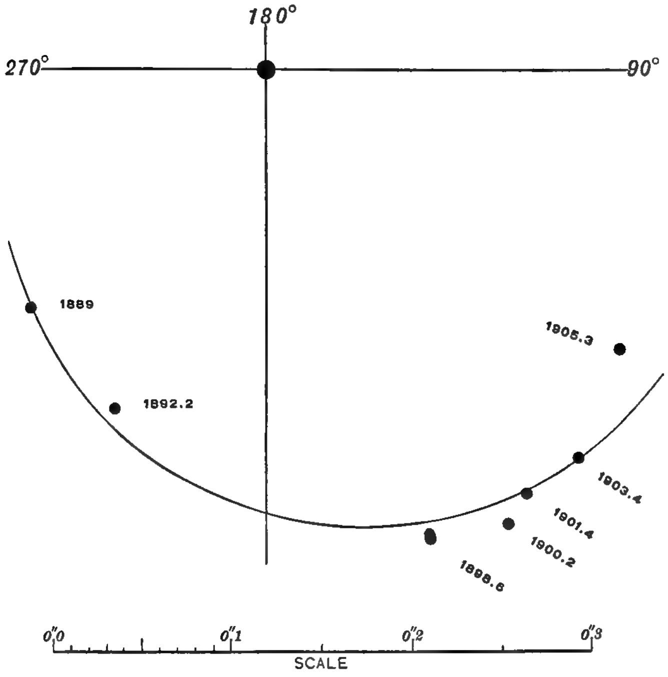
6841. **Σ 1839.** Fixed. The proper motion in *A.G. Harvard* is 0″031 in 180°. 17 26

1868.46	82°0	14″43	4*n*	Δ	8.2...8.3

[H^1...Δ (**II**)...Cin^5...*Annals Toulouse Obsy.* **III**...]

(See p. 1076)

17^m 29^s **6842.** **β 1111.** (Wide pair = Σ 1835 = **H II. 38** = **Sh 177.**) The duplicity of the smaller component of Σ 1835 was discovered with the 36-inch. The measures are sufficient to show that this is a binary in rapid motion. It will probably take a place with the short period systems. Thus far the motion has been about 6° per year, with little or no change in the distance. It is not improbable that the distance now is about maximum, and that the mean angular motion is much more rapid. Only Mt. Hamilton measures are shown on the diagram.



β 1111. BC

The following are all the measures of the close pair:

B and C

1889.40	315°3	0″19	3*n*	β
1890.43	321.2	0.25±	2*n*	Sp
1892.17	336.1	0.21	4*n*	β
1898.44	336.6	0.30	2*n*	Lewis
1898.48	18.4	0.22	3*n*	β
1898.57	19.0	0.28	4*n*	A
1899.30	28.8	0.25	1*n*	Lewis
1900.20	27.8	0.29	3*n*	A
1901.39	31.3	0.28	4*n*	A
1902.34	42.9	0.25	1*n*	A
1903.39	38.3	0.28	3*n*	A
1903.42	36.9	0.25	1*n*	Lewis
1905.33	50.9	0.25	3*n*	A

There has been no change in the position of this star with reference to A. A few of the measures are given. The principal star is B. A. C. 4766.

A and BC (= Σ 1835)

1853.98	189°5	6″27	6*n*	Δ
1866.72	188.4	6.24	3*n*	Δ
1885.41	187.9	6.33	3*n*	Per
1889.40	189.6	6.36	3*n*	β
1889.80	188.4	6.29	6*n*	Sp
1892.17	189.3	6.25	2*n*	β
1898.48	189.5	6.38	3*n*	β
1898.56	189.9	6.47	3*n*	A
1903.38	189.8	6.29	2*n*	Hu

[β (**XVI**) .... β (2956, 3142) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) .... Sp (**III**) .... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXIII**, 403; **LXIV**, 799) .... A (3585) (*Bul. L. O.* No. 11) ...]

General references:

[Ma (*F. S.* **I, II**) ... Ma (**X, XII, XIII, XV**) ... Ma (324) ... Bp ... H (**IV**) ... Se ... Wr ... Ba (**II, III**) ... Ra (**XXII**) ... Du ... Gl ... WS ... Δ (**I, II**) ... Δ (1031, 1036) ... Per ... Per (2684, 2748) ... See and Wellman (*Beob. Berlin*, No. 6, 1892) ... Glasenapp (**I, II**) ... *Annals Toulouse Obsy.* **III** ... Giacomelli (**II**) ...]

6843. **Ho 262.** Apparently change in angle. 17^m 30^s

1896.44	272°9	5″07	3*n*	Ho
1902.35	270.4	5.50	5*n*	Doo
1905.09	269.4	5.34	3*n*	Doo

[Ho (2977, 3558) ...]

6844. **Σ 1840.** (= **H N. 71.**) No measures in H; described as "double, unequal." It is either Σ 1840, or Σ 1841 *rej.* No change since Σ. The principal star is given a small proper motion: 17 33

Batterman	0″045 in 266°2
Kustner	0.043 in 264.6

The companion seems to have the same movement:

1867.41	222°7	27″27	4*n*	Δ
1879.30	222.9	27.76	1*n*	β
1905.14	221.7	27.09	1*n*	β

[H^1 ... Δ (**II**) ... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... β^3 ... β^6 ...]

6845. **A 148.** No other measures. 17 47

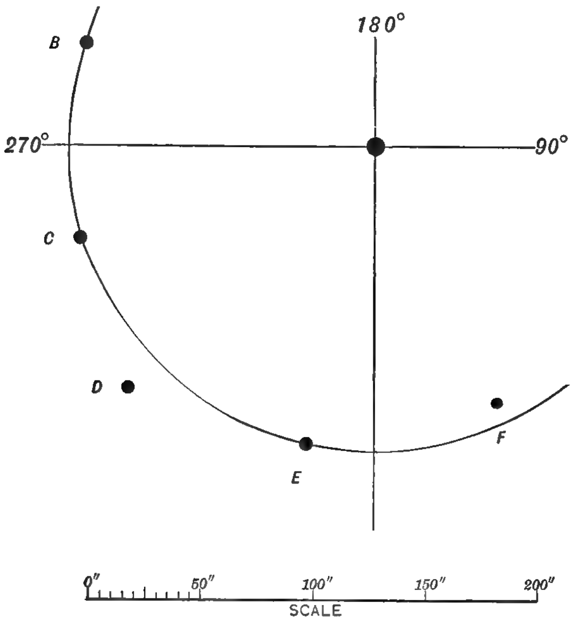
[A (3741) (*Bul. L. O.* No. 3) ...]

6846. **β 615.** Discovered with the 18½-inch. Σ 1834 is 2^m exactly preceding. All the later measures are given. 17 52

1892.17	236°6	2″84	3*n*	β
1892.37	235.0	2.52	3*n*	Lv
1898.28	233.2	2.82	5*n*	Doo
1901.31	233.8	2.68	2*n*	A
1903.41	236.7	2.74	2*n*	Biesbroeck
1905.17	235.5	2.69	3*n*	Doo

[β (**X**) ... β^1 ... β (3142) (*Pub. L. O.* **II**) ... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... Doolittle (*Pub. Flower Obsy.* **I, II**) ... A (*Bul. L. O.* No. 11) ... Biesbroeck ...]

$17^m\ 59^s$ **6847.** **H 548.** "Sextuple. A curious semi-circle of five stars, one nearly in the center." Examined (1875); small stars. The central one I could not see with 6-inch. Recently identified and measured. All the measures are made with the central star as the primary. The brighter stars, C, D, E, and F, are respectively DM (36°) 2481 (9.0), 2482 (9.3), 2483 (9.4), and 2484 (9.5).



H 548

AB	1903.31	250°.7	137″.06	1*n*	β^6	13.0...9.7
AC	1903.31	287.7	138.70	1*n*	β^6	...9.2
AD	1903.31	314.4	154.84	1*n*	β^6	...9.4
AE	1903.31	347.3	138.12	1*n*	β^6	...9.7
AF	1903.31	26.4	126.91	1*n*	β^6	...9.7

There is a faint star on the line of AC.

18 9 **6849.** **Σ 1844.** Fixed.

1868.38	217°.5	1″.59	4*n*	*Δ*
1904.71	214.4	1.75	1*n*	Hu

[Ma (*F. S.* **I**)...*Δ* (**II**)...Cin^5...]

18 14 **6851.** **Σ 1837.** Slow angular motion, the distance remaining unchanged. The observations show nothing as to the nature of the motion.

1848.37	323°.4	1″.55	2*n*	Ma
1848.45	324.5	1.50	1*n*	Mh
1868.23	312.9	1.39	6*n*	*Δ*
1875.87	309.8	1.26	4*n*	Sp
1879.44	307.8	1.38	3*n*	Hl
1888.42	303.2	1.45	3*n*	Hl
1895.96	306.5	1.26	7*n*	Com
1902.43	303.5	1.41	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**VIII**)...WJ...WJ^2...J^3...Mh...Se...Ra (**XXIII**)...Hd...*Δ* (1572)...*Δ* (**II**)...Do (2303)...WS...Sk...Pt...Flm...Cin^4...Cin^5...Lv^1...T (2898)...Sp (2133)...Sp (**II**)...Hl (*Wash. Obsns.* 1884)....Hl (**I, II**)....β^3....Wilson (Cin^{10})....Glasenapp (**I**)....Com (**X**)....Brown (3645)...Ho (3558)...Dyson (*Mon. Not.* **LIX**, 400; **LX**, 505)...*Annals Toulouse Obsy.* **III**....Lewis (*Observatory* **XXV**, 269)....Scott (*Mon. Not.* **LXIV**, 52)...Biesbroeck...]

6852. **Σ 1838.** (= **H III. 20 = Sh 178.**) The change suspected by Struve has not been confirmed, and it is now apparent that the components are fixed. (See No. 6838.) $18^m\ 14^s$

1864.75	333°.7	8″.99	3*n*	*Δ*
1885.92	334.2	9.18	7*n*	Per
1889.39	333.6	8.92	4*n*	Giacomelli
1904.37	334.0	9.16	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Wr...Se...Ra (**XXIV**)...OΣ (**IX**)...*Δ* (1111)...*Δ* (**I, II**)...Je (2351)...Per...Per (2748)...Glasenapp (**III**)...*A. G. Leipzig*, p. 209...*Annals Toulouse Obsy.* **III**...Giacomelli (**II**)...]

6853. **O. Stone 31.** Probably unchanged. 18 15

1897.47	285°.8	0″.31	1*n*	See	7...7.6
1902.54	282.7	0.60	2*n*	Innes	

[Cin^4....Cin^6....See (3496)....Innes (*Mon. Not.* **LXIII**, 76) (*Annals Obsy. Cape Good Hope*, Vol. **II**, Part 4)...]

6854. **H 2716.** The only later observation is the following: 18 22

1902.28	85°.9	5″.02	Es	9.1...9.3

Espin (*Mon. Not.* **LXII**, 532)...]

6855. **H 549.** "*Yellow : blue.*" No motion. 18 44

1830+	143°.1	20″±	1*n*	H	8 ...12–13
1879.85	136.7	30.78	2*n*	β	8.2...10.7
1903.28	136.5	30.90	3*n*	β	8.4...10.4

[H (**V**)...β^3...β^6...]

6856. **Σ 3084** *rej.* From *Catalogus Novus.* Nothing since Struve but this: 18 45

1905.11	15°.0	30″.20	2*n*	β^6	8.6...10.4

6857. **β 225.** (= **Hd 138**; AB = **H N. 80 = Sh 179.**) The close pair was discovered with the 6-inch. It is found, however, in the subsequently published observations of the Harvard Observatory. 18 48

There is no change in AB, and very little, if any, in the close pair. This is a naked-eye star in *Virgo*, according to Heis but Gould places it in *Libra*.

B and C

1878.88	101°.4	1″.35	4*n*	Cin
1890.39	101.5	1.66	2*n*	Gla
1897.38	101.3	1.58	3*n*	Doo
1898.34	96.5	1.37	4*n*	A
1903.32	100.4	1.28	3*n*	β

A and B

1847.70	295°7	35″23	1*n*	J	
1875.70	295.5	35.03	3*n*	Δ	6.0...
1897.34	295.5	35.24	3*n*	Doo	6.0...7
1903.36	295.9	35.00	2*n*	β	6.7...

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Δ (I)...Cin^4...Cin^6...Hd...Glasenapp (I)...J^2...Sellors (3240)...Doolittle (*Pub. Flower Obsy.* **I, II**)...A (3585)...β^6...]

18^{m} 48^{s} **6858. H 546.** There is a considerable error in Herschel's place (see No. 6823). He called the colors, *red : blue*. The only measures are of late date:

1902.18	42°4	39″39	2*n*	β	7.0...10.4

[β (2044)...β^6...]

18 48 **6859. Σ 1841** *rej.* The principal star has a small proper motion:

Battermann	0″047 in 266°4
Schroeter	0.046 in 284.0

The only measure is:

1905.11	265°1	34″82	2*n*	β^6	7.0...10.6

18 54 **6860. A 149.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

19 6 **6861. H 4678.** "R. A. somewhat uncertain for want of zero stars." The place is substantially correct.

1903.93	312°2	9″06	2*n*	β^6	9.9...11.5

19 10 **6862. H 4679.** These are all the observations:

1879.42	306°8	16″29	1*n*	Cin	
1890.39	306.7	15.72	2*n*	Gla	8.0...9.2

[Cin^5...Glasenapp (I)...]

19 28 **6863. Cordoba.** Double in *Cordoba Zones.*

1902.54	133°6	2″31	2*n*	Innes
1905.48	133.0	2.17	4*n*	Doo

[β^6...Innes (*Mon. Not.* **LXIII**, 76)...]

19 34 **6865. Σ 1851.** No motion.

1869.08	331°8	10″19	3*n*	Δ

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...]

(See p. 1076)

19 51 **6866. H 2718.** Nothing but the following since Herschel:

1903.93	216°8	28″71	2*n*	β^6	9.6...9.8

20 ± **6867. H VI. 52.** Noted "unidentifiable" in the Synopsis of H's observations, with place as given in Part I. In his original catalogue (*Philosophical Transactions*) it is described as "a star between ε and *f* [*Bootis*]. Distance above 1′. Unequal."

6868. OΣ 282 *rej.* (= **H** 2719.) Rejected in *Poulkowa Catalogue* of 1850; not measured by OΣ. Fixed. 20^{m} 5^{s}

1867.37	215°6	22″91	3*n*	Δ
1881.33	215.0	23.35	2*n*	β
1897.41	214.6	22.57	3*n*	Doo
1898.29	216.0	22.81	3*n*	Hu

[Ma (**XI, XIII**)....Δ (I)....β^4....Hu (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **I**)...]

6869. The large proper motion of these two small stars, making a 45″ pair, was detected by Bellamy (*Monthly Notices*, LX, 125) in measuring the Oxford photographic plates. These stars are Nos. 5072 and 5073 of *A. G. Berlin*, B. One of them only, probably the first, is in the DM as (24°) 2733 (9.0). The only micrometrical measures are my own, but there are some meridian and photographic positions for comparison, and these taken together show but little relative motion, if any at all. 20 11

1881.0	74°9	45″66		*A. G. Berlin*
1900.0	74.3	45.38		Oxford Plates
1900.4	74.7	46.85		Porter (3831)
1900.6	75.0	45.51		Abbadia
1903.02	74.7	45.21	4*n*	β^6
1904.31	74.5	45.02	3*n*	β
1905.42	74.1	45.22	2*n*	β

Comparing the principal star of this wide pair with DM (24°) 2734, we have:

1855	132°	224″		DM
1880.9	124.0	210.6		*A. G. Berlin*
1901.4	121.8	185.1		Paris Map
1903.02	120.6	182.30	4*n*	β^6
1904.32	120.2	180.57	2*n*	β
1905.42	120.0	179.34	3*n*	β

There is a 11.7 m star nearer:

1903.02	245°4	154″52	2*n*	β
1905.42	246.8	155.54	2*n*	β

(See p. 1076)

6870. Σ 1843. (= **H** 2722.) Fixed. 20 15

1866.95	188°6	20″10	3*n*	Δ
1879.30	186.9	19.86	1*n*	β
1902.52	187.6	20.04	2*n*	Hu

[Ma (*F. S.* I)....Ma (**XI**)....Δ (**II**)....β^1....β^3....Espin (*Mon. Not.* **LXII**, 529)....]

6871. H 2721. B is DM (22°) 2700 (9.3). 20 16

1905.32	139°0	101″16	1*n*	β^6

6872. Σ 1849. Without change. 20 18

1867.71	3°9	1″29	3*n*	Δ
1904.71	1.2	1.31	1*n*	Hu

[Ma (*F. S.* I)...H (V)...Δ (**II**)...Cin^5...] (See p. 1076)

20m 57s **6875.** **Σ 1842.** The angle in Struve appears to be too small. There is no evidence of change.

1844.35	13°8	2″90	1*n*	Ma
1856.77	15.8	2.80	3*n*	Se
1867.61	14.0	2.68	3*n*	Δ
1878.81	15.7	2.68	2*n*	Sp
1887.38	15.6	2.70	2*n*	Hl
1902.27	14.8	2.77	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H¹... Se ... Do (2198) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Pl...Flm ...WS ...Gl ...Sk²... Sp (**II**)... Δ (**II**)... Hl (**II**)... Big ... Collins (*A. J.* 378) ... Glasenapp (**IV**) ... Brown (3645) ... Doolittle (*Pub. Flower Obsy.* **I**)... *Annals Toulouse Obsy.* **III**...]

21 9 **6876.** 52 *Hydrae.* **β 940.** Discovered with the 18½-inch. The principal star has a proper motion of 0″063 in the direction of 228°4. It is probable that the companion is moving with it, as otherwise the distance would be less at the date of the last measures, and the angle nearly 15° more than it was in 1879.

1889.38	278°7	4″27	3*n*	β
1897.44	278.7	5.37	2*n*	See
1899.27	277.5	4.37	2*n*	β
1901.43	279.4	4.22	3*n*	Doo

[β (**XIII**)...β³...β (2957) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...See (3496)...Doolittle (*Pub. Flower Obsy.* **II**)...]

21 34 **6877.** **Ho 386.** No change.

1903.31	328°1	3″72	3*n*	Doo

[Ho (3233) ...Innes (*Southern Double Stars*, p. 313)...]

21 58 **6878.** **H 550.** B has a 13.5 m companion, 35°0 : 13″5 (1903).

1880.37	110°5	31″97	1*n*	Big	9.5...10
1903.22	110.1	31.26	2*n*	β⁶	9.5... 9.7

21 59 **6879.** **Ho 542.** The only later position is:

1902.34	263°6	0″50	3*n*	Doo

[Ho (3557)...Doolittle (*A. J.* 547)...]

(See p. 1076)

22 2 **6880.** φ *Virginis.* **Σ 1846.** The measures are somewhat discordant, but probably a little change in distance. There is a small common proper motion.

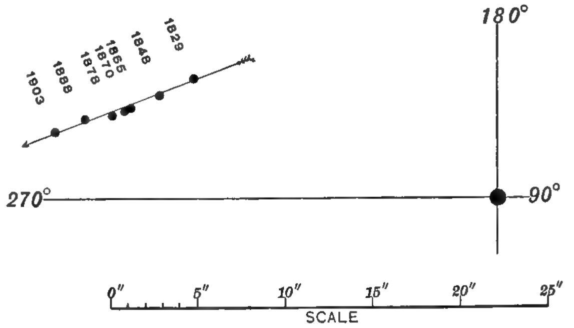
Auwers	0″157 in 269°3
A. G. Nico.	0.153 in 269.3

1852.22	107°4	4″34	1*n*	Σ
1867.11	112.6	4.09	4*n*	Δ
1883.09	109.1	4.26	7*n*	En
1885.42	109.3	4.51	3*n*	Per
1887.41	113.8	4.46	3*n*	Hl
1904.37	110.5	4.68	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII**) ... Mh... OΣ (**IX**) ... Flm...WS ... WS²... Gl... H (**IV**)...Pk...Pt...Per... Per (2748)... En (2663)... Sp (**II**)... Glasenapp (**I**) ... Δ (**II**)... Hl (**II**)... T (3185)... Cin⁵ ... Wilson (Cin¹⁰) ... Bryant (*Mon. Not.* **LX**, 505)...HΣ (**XII**)..]

6881. **Σ 1847.** The motion is rectilinear. From measures down to 1878 Gore finds the proper motion of A, assuming the companion to be stationary, to be 0″105 in the direction of 114°1. The components are SD (9°) 3947 and 3946. 22m 14s

1829.81	248°4	18″73	4*n*	Σ
1848.45	253.1	20.17	2*n*	Mh
1865.36	256.0	21.66	4*n*	Δ
1870.10	256.8	21.93	3*n*	Δ
1878.30	257.8	22.63	2*n*	β
1888.42	259.0	24.09	2*n*	Hl
1903.34	261.4	25.56	3*n*	β



Σ 1847

The six sets of measures by Σ, Δ, Hl, and β (1829–1903) give 0″109 in 110°7 for the most probable proper motion of A. Furner and Storey get a much smaller value from the meridian positions, and infer that the larger proper motion is in the small star.

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Flm... Δ (1572)... Δ (**II**)... Sk³... Pt...Cin⁵ Cin⁶... Wilson (Cin¹⁰)... Glasenapp (**I**)... β¹... Hl (**II**)... Gore (*Mon. Not.* **XLVIII**, 78)...Furner and Storey (*Mon. Not.* **LXIV**, 446)...β⁶...]

6882. **Ho 543.** The only later measures are: 22 21

1902.34	238°3	4″45	4*n*	Doo

[Ho (3557)...]

6883. **Σ 1848.** Probably fixed. 22 39

1869.57	361°0	3″27	5*n*	Δ
1880.37	360.3	3.17	1*n*	β
1883.43	360.0	2.68	2*n*	Ho
1905.25	358.4	2.82	4*n*	Doo

[Ma (*F. S.* **I**)... Δ (**II**)...β³...Ho (2978)...]

6884. **Cordoba.** The smaller star is Cord. G. C. 19616. Measures by See (3496). 22 46

6886. **Egbert 3.** Discovered by Egbert at Cincinnati in 1879. Apparently fixed. 22 58

1903.35	199°1	3″55	2*n*	β	8.9...9.2

[Cin⁵...Cin⁶...β⁶...]

$23^{m}\,16^{s}$ **6887.** **Σ** 1850. (= **Sh** 180.) Fixed.

1868.57	261°.9	25″.48	4*n*	Δ
1880.39	262.1	25.39	1*n*	β
1889.38	262.1	25.70	5*n*	Giacomelli

[Ma (*F. S.* I)...Ma (**XI, XIII**)...H^{1}...Da^{3}...Ra (**XXIV**)...OΣ (**IX**)...WS...Gl... Δ (1185)....Δ (I, II)....Per....Per (2748)....β^{3}....Giacomelli (**II**)....Glasenapp (**I, III**)...*Annals Toulouse Obsy.* **III**...]

23 45 **6889.** **Σ** 1852 *rej.* Early measures wanting.

1901.24	268°.0	24″.68	2*n*	β	7.2...9.5
1904.37	267.5	25.09	1*n*	Hu	

[β^{3}...Wilson (Cin^{10})...β^{5}...]

23 46 **6890.** **β** 462. Discovered with the 18½-inch. All the later measures are given.

A and B

1880.32	328°.9	1″.96	1*n*	β
1891.30	325.1	2.16	3*n*	β
1899.64	325.5	2.22	3*n*	Doo
1905.09	324.8	2.15	3*n*	Doo

A and C

1898.36	66°.5	15″.38	1*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78) ...β^{3}...β (3114)(*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

23 52 **6891.** **Ho** 544. The only later position is:

1902.34	232°.6	14″.20	5*n*	Doo

[Ho (3557)...]

24 8 **6893.** **Σ** 1853. Fixed.

1867.88	86°.2	2″.59	3*n*	Δ
1895.40	86.2	2.61	3*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**).. Δ (**II**)... Sp (**II**) ...Cin^{5}... Glasenapp (**IV**)...*A. G. Leipzig*, p. 248...]

24 9 **6894.** **Σ** 1887. Probably rectilinear motion.

1867.38	237°.1	3″.24	3*n*	Δ
1879.33	230.7	3.40	1*n*	Cin
1897.43	234.1	2.84	3*n*	Doo

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^{5}... Doolittle (*Pub. Flower Obsy.* **I**)...]

24 41 **6895.** **Σ** 1854 *rej.* Measures from Cin^{5}. The only later observation is:

1905.11	255°.9	25″.81	2*n*	β^{6}	7.0...10.5

24 43 **6896.** **β** 117. (= **Hd** 139.) Discovered with the 6-inch. There is no relative motion, but it is undoubtedly a physical system, as the components have same large proper motion of 0″.424 in the position-angle of 153°.2 (Porter). Some of the later measures are:

1880.33	91°.4	2″.18	1*n*	β
1883.42	95.4	2.36	2*n*	Hl
1884.41	95.3	2.36	3*n*	Hl
1888.35	92.9	2.26	2*n*	T
1890.44	96.6	2.53	2*n*	Gla
1898.43	93.0	2.24	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^{3}...Hd...Cin^{4}...Cin^{5}...Cin^{6}...Hl (**II**)....Wilson (Cin^{10})....T (2991)....Lv^{1}....Glasenapp (**I**)....Doolittle (*Pub. Flower Obsy.* **I**)...Brown (3645)...Scott (*Mon. Not.* **LXIV**, 52)...]

6897. **H** 552. No star in the catalogues corresponding to this place. I could not find any such pair in measuring No. 6907. $24^{m}\,43{:}^{9}$

6898. **H** 2725. The only measures are: 24 52

1900.37	137°.8	22″.86	2*n*	Es	7...11.7

[Espin (3717)...]

6900. **Cordoba.** B. is Cord. G. C. 19677. Measures by See (3496). 25 8

6902. **H** 238 "Triple; the three stars exactly in a line The middle the smallest." 25 13

6903. **H** 2723. The later measures disagree in distance. 25 24

1880.41	137°.2	27″.23	1*n*	Cin	8.0...10.5
1882.40	138.6	28.10	1*n*	W	8.0... 9.5
1904.44	138.0	26.91	2*n*	β	8.5...10.0

[Cin^{6}...Wilson (Cin^{10})...β^{6}...]

6904. **A. G.** 195. Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 25 39

6905. **β** 1112. Discovered with the 12-inch. In Gould 6.4 m. 26 3

1897.37	3°.1	2″.46	3*n*	A
1897.41	7.7	2.66	2*n*	See
1905.50	7.3	2.49	3*n*	Doo

[β (**XVI**)...:β (2956)(*Pub. L. O.* **II**)....A (3465)...See (3496).... Innes (*Mon. Not* **LXIII**, 76)...]

6907. **Glasenapp** 3. From Glasenapp (I). 26 10

1903.23	316°.5	69″.38	2*n*	β^{6}	9.3...9.4

6908. **H** 2729. The only measure is: 26 12

1901.36	56°.1	27″.52	2*n*	Es	8.7...11.0

[Espin (*Mon. Not.* **LXII**, 532)...]

26^m 41^s **6909.** **Σ** 3086. No change since Struve.

1868.74	272°0	5″82	4*n*	Δ
1901.46	270.5	5.83	2*n*	Kustner

[Ma (*F. S.* **I**)... Δ (**II**)...Cin^5...Kustner (3821)...]

26 42 **6910.** *ρ Bootis.* **H** 2728. Another estimate of H, D = 35″±. The large star has a proper motion:

Auwers	0″166 in 318°8
Bossert	0.151 in 316.9

1879.87	334°0	53″25	2*n*	β	...11.7
1889.15	334.6	52.67	1*n*	β	
1892.50	335.1	51.78	4*n*	Ho	...12
1902.18	335.8	50.06	2*n*	β	...12.5
1903.11	335.5	50.13	3*n*	β	

These measures give for the most probable motion of A, 0″161 in 310°8.

[β^3...Ho (3234)...β^5...β^6...]

27 1 **6912.** **β** 238. Discovered with the 6-inch. Unchanged.

1893.42	91°1	6″94	2*n*	Wilson
1893.47	90.6	6.94	1*n*	Lv
1901.18	87.2	6.85	3*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Cin^4...Lv...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

27 14 **6914.** **Σ** 1855. (= **H** 553.) Unchanged. There is a 12.5 m star near C, 64°7 : 16″1 (1904).

1866.41	248°7	15″39	3*n*	Δ
1904.38	248.6	15.50	2*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)... Δ (**II**)...Cin^6...β^6...]

27 15 **6915.** *γ Bootis.* **β** 616. The faint companion was detected with the 18½-inch. Auwers gives the proper motion of *γ Bootis*, 0″198 in the direction of 320°5. This movement corresponds to the change in the position of the companion. The minimum distance of 19″5 occurred about 1780.

1878.25	98°6	26″18	2*n*	β
1891.24	103.6	28.23	3*n*	β
1898.27	105.5	29.38	2*n*	β
1898.28	102.2	29.37	1*n*	Doo
1904.41	107.2	30.03	2*n*	β

[β (**X**)...β^1... β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...β^6...]

27 21 **6916.** **Ho** 387. No change.

1903.30	242°0	9″44	3*n*	Doo

[Ho (3234)...]

27 31 **6917.** **H** 554. Examined (1876) and AB each about 10 m; distance estimated 10″. Third star not seen with 6-inch. It is not mentioned by the later observers.

(See p. 1076)

A and B

1880.39	291°9	12″02	3*n*	Big	8.7... 9.2
1902.33	294.3	12.11	2*n*	Es	8.9... 9.1
1904.29	292.0	11.80	2*n*	β	9.0... 9.3

B and C

1904.26	308°2	37″39	1*n*	β	...12.0

[Big...Es (*Mon. Not.* **LXIV**, 678)...β^6...] (See p. 1076)

6919. 5 *Ursae Minoris.* **H** 2733. The large star has a proper motion of 0″026 in 10°2 (Auwers). The only measures are: 27^m 42^s

1879.30	129°4	56″45	1*n*	β	...10.5
1897.55	130.4	57.85	4*n*	Doo	...14.0
1905.12	130.2	57.37	2*n*	β	...11.7

The 40-inch shows a 14 m star nearer than this:

1905.14	122°3	21″48	1*n*	β

[β^3...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

6922. **H** 1255. B is W^2 XIV. 575, 1^{s}2 *p* and 34″ *n*. 28 13

1880.33	341°3	38″20	1*n*	Big	8.5...8.5
1900.38	340.6	38.46	2*n*	Es	

[Big...Espin (3717)...]

6923. **Hu** 57. (AB = **OΣ** 283.) The companion of OΣ 283 was found to be double by Hussey in 1898. It appears, however, from the subsequently published observations of HΣ that it had been detected and measured at Poulkowa in 1887. His measure is: 28 17

1887.51	141°3	1″47	1*n*	HΣ	11...11–12

There is no material change in AB:

1867.72	130°2	5″10	4*n*	Δ
1878.28	131.1	5.00	2*n*	β
1887.51	132.0	5.22	1*n*	HΣ
1898.35	128.3	5.17	2*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)... Δ (**II**)...β^1... Hu (*A. J.* 480)(*Pub. L. O.* **V**)(*Pub. A. S. P.* **X**, 182)...HΣ (**XII**, p. 70)...Do (3930)...]

6924. **H** 2732. "Very difficult; verified with 240." Examined with the 40-inch twice in 1903. No companion seen. This is DM (45°) 2193 (8.7). The 9.2 m star, DM (45°) 2192, is 0^{s}3 *p* and 0″9 *n*, and has a distant smaller companion. 28 19

The proper motion is 0″244 in 286°7 (Porter).

6926. **Σ** 1858. Fixed. 28 41

1868.63	35°9	2″30	4*n*	Δ
1880.47	37.2	2.55	2*n*	Sp
1903.38	35.9	2.50	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H^2...Wr...Se...Ra (**XXIV**)...OΣ (**IX**)...Du ....Pl....WS^2....Do (2198) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Sk^2.... Δ (1207)... Δ (**I, II**)...Pl...Per...Per (2748)...Ho (3234)...Sp (**II**)...Glasenapp (**IV**)....Knorre (3518)....*Annals Toulouse Obsy.* **III**....Boeger (*A. J.* 522)...Biesbroeck...]

28^m 45^s **6927. A. G. Clark 6.** (= **Ho 545.**) Discovered by Alvan G. Clark with the 12-inch now at the Vienna Observatory. In a low-power field with *σ Bootis*, *np*. Change uncertain. The later measures are:

1896.36	316°.4	0″.54	2*n*	Ho	8.3...8.3
1899.48	134.9	0.76	1*n*	A	8.5...8.7
1902.92	141.2	0.69	7*n*	Doo	
1904.30	319.1	0.76	2*n*	A	

[Δ (I) . . . Ho (3557) . . . A (3639) . . .]

28 50 **6928. Σ 1857** *rej.* Examined and estimated, 340°: 20″: 9...10.5 (1876). Recently measured:

1903.21	340°.4	18″.46	2*n*	β^6	9.2...10.7

28 57 **6929. OΣ (App) 129.** B is W^2 XIV. 588. No change.

1905.30	68°.0	78″.43	2*n*	β

[Δ (I) . . . Franz (3464) . . . β^6 . . .]

29 40 **6931. β 941.** Discovered with the 18½-inch. Evidently unchanged.

1888.80	222°.1	0″.6 ±	3*n*	Sp
1893.40	216.8	0.83	3*n*	W
1893.96	215.5	0.7 ±	2*n*	Sp
1897.41	223.0	0.5 ±	1*n*	Sp
1905.23	214.9	0.71	7*n*	Doo

[β (XIII) . . . β^8 . . . Lv^1 . . . Sp (III) . . . Wilson (   ) . . .]

29 47: **6932. Ma 6.** This is No. 8 of the list of new pairs in Ma (XI). I could not find any pair in or near this place. The nearest found was L 26492, 14^{h}24^{m}44^s; +5° 18′, which agrees in angle and magnitudes, but distance greater.

1903.21	195°.6	55″.42	2*n*	β^6	7.0...10.5

29 54 **6933. Hu 574.** The only later observations are:

1903.42	105°.7	0″.24	2*n*	Gr. Obsy.

[Hu (*Bul. L. O.* No. 27) . . . Lewis and Bowyer (*Mon. Not.* **LXIV**, 799) . . .]

30 8 **6934. Σ 1860.** Without sensible change.

1867.92	99°.0	1″.29	4*n*	Δ
1879.33	98.2	1.13	2*n*	Cin

[Ma (X, XI) . . . Ma (*F. S.* I) . . . Δ (II) . . . Cin^5 . . .]

30 42 **6936. Σ 3087.** Not measurable by Dembowski in 1867. No motion since Struve.

1897.91	40°.6	1″.92	3*n*	Doo
1902.49	44.9	1.96	2*n*	Hu

[Ma (*F. S.* I) . . . Δ (1736) . . . Cin^5 . . . Doolittle (*Pub. Flower Obsy.* I) . . . Lewis (*Mon. Not.* **LXIV**, 799) . . .]

30^m 56^s **6937. Σ 1861.** Without change.

1867.88	174°.5	14″.00	3*n*	Δ
1904.28	174.2	14.07	2*n*	β

There is a distant 13 m star:

1904.26	300°.7	46″.36	1*n*	β

[Ma (XI) . . . Ma (*F. S.* I) . . . Δ (II) . . . β^3 . . . *A. G. Leipzig*, p. 209 . . . β^6 . . .]

31 42 **6939. β 804.** Discovered with the 15½-inch at the Washburn Observatory. No sensible change. The later measures are:

1888.74	159°.5	1″.39	2*n*	Com
1891.26	160.9	1.29	3*n*	β
1898.39	161.6	1.37	3*n*	Doo

[β (XII) . . . β^4 . . . β (3114) (*Pub. L. O.* **II**) . . . Com (VI) . . . Doolittle (*Pub. Flower Obsy.* I) . . .]

32 5 **6941. β 226.** Discovered with the 6-inch. There may be a slow advance in the angle.

1878.37	80°.4	1″.05	2*n*	Cin
1879.44	82.7	0.95	1*n*	β
1880.34	83.1	0.99	1*n*	Cin
1884.35	84.7	1.01	2*n*	Wilson
1890.46	87.6	0.9 ±	4*n*	Gla
1901.26	84.8	1.07	4*n*	Doo
1904.36	90.0	0.96	2*n*	A

[β (IV) . . . β (*Mon. Not.* **XXXIV**, 382) . . . β^3 . . . Sp (II) . . . Cin^4 . . . Cin^5 . . . Cin^6 . . . Wilson (Cin^{10}) . . . Glasenapp (I) . . . Doolittle (*Pub. Flower Obsy.* II) . . .]

32 8 **6943. Σ 1862.** (= **H 240.**) Fixed.

1866.26	127°.2	14″.54	3*n*	Δ
1904.28	126.4	14.64	2*n*	β

[Ma (XI) . . . Ma (*F. S.* I) . . . Δ (II) . . . Glasenapp (IV) . . . β^6 . . .]

32 58 **6945. β 805.** Discovered with the 15½-inch at the Washburn Observatory. The later observations show no change.

A and B

1888.93	133°.8	23″.46	2*n*	Com
1899.29	133.8	23.47	2*n*	β

C and D

1888.93	243°.1	1″.99	1*n*	Com
1905.13	237.9	2.21	3*n*	Doo

A and C

1888.41	42°.0	123″.45	1*n*	Com
1899.29	41.4	124.38	2*n*	β

[β (XII) . . . . β^4 . . . . Com (VI) . . . . β (*Pub. Y. O.* I) . . . . Doolittle (*Pub. Flower Obsy.* II) . . .]

33 27 **6946. β 806.** The duplicity of the smaller member of the wide pair was discovered with the 15½-inch at the Washburn Observatory; and in measuring that with the 36-inch the other star was found to be a still closer pair, thus forming

an apparently interesting quadruple group. All the later measures are given:

A and B

1899.45	97°1	0″69	3*n*	A
1901.43	94.2	0.81	3*n*	Doo

C and D

1890.39	344°9	1″20	3*n*	β
1899.41	341.6	1.21	3*n*	A
1901.43	339.2	1.29	3*n*	Doo

A and C

1890.39	67°3	71″48	3*n*	β
1899.32	66.7	71.75	1*n*	β
1899.38	67.2	71.97	1*n*	A
1901.43	67.7	72.20	2*n*	Doo

A and *a*

1899.34	327°2	17″05	3*n*	A

[β (**XII**)...β¹...β (3048)(*Pub. L. O.* **II**)... A (3639)... Doolittle (*Pub. Flower Obsy.* **II**)...]

34m 1s **6948.** **Σ 1863.** Slow angular motion, without sensible change in distance. No. 9 of the list of new pairs in Ma (XI) is identical with this. The proper motion is given as 0″045 in 302°4 (*A. G. Harvard*).

1841.21	107°3	0″65	3*n*	OΣ
1850.14	105.0	0.67	2*n*	OΣ
1865.83	94.8	0.6±	5*n*	Δ
1879.04	94.8	0.68	2*n*	OΣ
1882.48	92.3	0.56	8*n*	Hl
1892.35	91.0	0.63	3*n*	β
1895.54	90.8	0.50	3*n*	Com
1897.55	88.0	0.73	3*n*	A

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XIII, XV**) ... Se¹ ... En (1674, 2663) ... Du ... Δ (1111, 1572)... Δ (**I, II**) ... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13) ... Flm... WS... Gl... Sk ... OΣ (**IX, X**) ... Big ... T (2898) ... Hl (*Wash. Obsns.* 1882, 1885) ... Hl (**I, II**)... β (3142)(*Pub. L. O.* **II**) ... Big (*Bul. Ast.* **XII**, 299)... Collins (*A. J.* 378)... Com (**X**)... Glasenapp (**IV**)... A (3465)... Greenwich Obsy. (*Mon. Not.* **LX**, 505; **LXI**, 486; **LXII**, 383)...Doolittle (*Pub. Flower Obsy.* **I**)....HΣ (**XII**)....Sk⁵....Lewis (*Observatory*, **XXV**, 269).... Biesbroeck....]

34 32 **6950.** **Howe 34.** Identified and measured:

1903.22	13°5	2″39	2*n*	β	9.5...9.5

[Cin⁵...Cin⁶...]

34 40 **6951.** **β 345.** Discovered with the 6-inch. Change is doubtful.

1892.37	303°5	0″94	3*n*	β	7.5...8.2
1897.45	301.9	0.98	3*n*	A	7+...8
1897.50	303.7	0.92	2*n*	See	7.2...8.1
1903.66	303.6	0.91	5*n*	Doo	

[β (**VI**)...β (2062, 3142)(*Pub. L. O.* **II**)...Cin⁴...Cin⁶...A (3465)... See (3496) ...Doolittle (*Pub. Flower Obsy.* **II**)...]

6952. **β 414.** *Centauri* 315. Discovered with the 6-inch. So far without change. In Gould 6.6 m. Lacaille 6052. 34m 42s

1896.49	346°5	0″90	4*n*	A
1897.45	344.9	0.89	3*n*	A
1901.38	348.1	0.82	1*n*	Doo

[β (**VII**)... β (2103, 2957) (*Pub. L. O.* **II**) ... Glasenapp (**I**) ... A (3395, 3465) ... See (3496)... Doolittle (*Pub. Flower Obsy.* **II**)...]

6954. *π Bootis.* **Σ 1864.** (= **H III. 8 = Sh 181.**) No change since Struve. Auwers gives the proper motion of A, 0″029 in 17°1. 35 5

1867.94	101°5	5″74	4*n*	Δ
1882.58	102.3	5.84	10*n*	Sp
1888.61	102.7	5.46	2*n*	Maw
1895.36	102.6	5.82	2*n*	Gla
1903.28	103.3	5.83	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (304, 324)... Ma (**IX, X, XI, XV**)...H (**VII**)... Da¹... K... K (409)... Ek (**I, III**)... Bes...Wr... Auwers (1393)... P¹... Fl... Se...Lu (1103)...Lu (**I, II, III**)...Wh... *Durham Obsns.* 1846-48... Flm... Δ (*Mem. Accad. Sci.*).... Δ (1031).... Δ (**I, II**)....Pk....Ra (**XXI, XXVII, XXVIII, XXX, XXXI, XXXIII, XXXIV, XXXV, XXXVIII, XXXIX, XLVII**) ... Amici (2155)...Pl... Du...Gl...WS²... Sk... Do (2198, 3680) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (2133)...Sp (**II**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**) ...T (2866)...Hayn (3051)...Je (2351, 2449)...Franz (2590)...Kustner (2584) ...Per... Per (2684, 2748) ... *Beob. Berlin*, No. 6, 1892... Giacomelli (**II**) ... Maw (**I**)....Glasenapp (**III, IV**)....Big....Big (*Bul. Ast.* **XII**, 299)....Cohn (3240)... Collins (*A. J.* 378)... Chofardet (3450) ... Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Biesbroeck...]

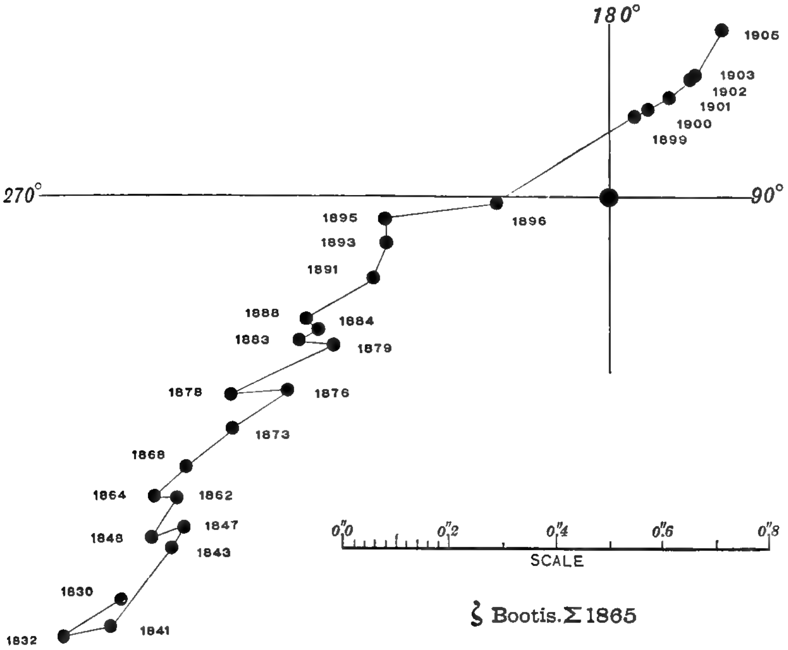
6955. *ζ Bootis.* **Σ 1865.** (= **H N. 114 = Sh 182.**) Until recently the motion was apparently rectilinear and uniform, implying a system of the 61 *Cygni* type. The measures of the last half a dozen years, however, make it probable that this is a binary of very long period. The observations of more than another century will be required to determine the period. So far there is nothing to indicate the maximum distance of the components in the fourth quadrant, and this cannot appear until nearly one revolution has been completed. The system has a small proper motion: 35 25

Auwers	0″041 in 108°3
Porter	0.030 in 109.6

The following measures are shown on the diagram:

1830.47	309°2	1″19	11*n*	Σ
1832.47	308.3	1.32	3*n*	Da
1841.16	310.4	1.24	6*n*	OΣ
1843.40	308.4	1.05	7*n*	Ma
1847.72	307.5	1.01	8*n*	OΣ
1848.11	306.5	1.07	3*n*	Da
1862.95	304.5	0.99	11*n*	OΣ
1864.78	303.2	1.02	6*n*	Δ
1868.49	301.9	1.00	2*n*	Δ
1868.68	303.2	0.88	6*n*	OΣ
1873.01	301.5	0.83	4*n*	OΣ
1876.43	303.9	0.73	3*n*	Hl
1876.52	298.4	0.68	5*n*	OΣ
1878.48	297.8	0.80	2*n*	Δ
1879.04	298.5	0.59	5*n*	Hl

1883.17	295°.1	0″.64	3*n*	OΣ
1884.43	294.8	0.60	3*n*	Hl
1888.54	292.4	0.61	2*n*	OΣ
1891.31	289.1	0.47	3*n*	β
1893.49	285.4	0.52	3*n*	Lewis
1893.53	277.5	0.34	2*n*	Lv
1895.33	276.1	0.42 ±	3*n*	HΣ
1896.38	273.2	0.21	1*n*	Lewis
1899.53	161.6	0.16	3*n*	A



ζ Bootis. Σ 1865

1900.19	156°.0	0″.18	2*n*	A
1901.37	149.1	0.22	3*n*	A
1902.34	145.5	0.27	1*n*	A
1903.36	144.8	0.28	3*n*	A
1905.44	145.9	0.38	3*n*	β

There is a distant star which makes H VI. 104:

1905.44	259°.0	99″.45	2*n*	β^6	...10

[Ma (*F. S.* **I**)....Amici (*Zach. Corresp. Astron.* **VIII**, 222)....Ma (324, 430).... Ma (**IX, X, XI, XII, XIII, XV**)...H 1...H 2...H (85)...H (**V**)...Wr...Mh ...Mh (*Sid. Mess.*, Sept. 1846)...Bp...BM (280)...Bes...K (409)...Wh... P 1...J 2...WJ 2...Da 1...Da 2...Da 3...Ek (**I, II**)...Fl...Miller (863) (*Mon. Not.* **XIII**, 223)...Se...Se 3...Se (975)...Se (*Comp. Rend.* **XLI**, 271)...Bond (*Am. Acad.* **II**, 144)...En (1518, 1674, 2663, 2742)...OΣ (**IX, X**)...Δ (1031, 1111, 1572)...Δ (**I, II**)...Flm...Amici (2155)...Kn...WS...Gl...Hd...Ba (**II**)...Sp (2133)...Sp (**II, II** App)...Do (2198, 2242, 3023, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Sk....Du....Hl (*Wash. Obsns.* 1884)....Hl (**I, II**) ...Perry (*Eng. Mech.* **XXVIII**, 192; **XXXIX**, 415)...Je (2351, 2772)...Kustner (2584)...Per...Per (2529, 2684, 2748)...T (3185)...Knorre (*Beob. Berlin*, No. 6, 1892)....Ho (2978)....Maw (**I**)....Wilson (*Mon. Not.* **LIV**, 317).... β (3114) (*Pub. L. O.* **II**) (*Mon. Not.* **LVIII**, 83)...Big...Big (*Bul. Ast.* **XII**, 299)...Knorre (3300, 3518)...Lv (*A. J.* 382)...Glasenapp (**IV, V**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)...A (3639) (*Bul. L. O.* No. 11)...Brown (3645)...HΣ (**XII**)...Sk 5 ...Biesbroeck...β 6...]

$35^m\ 35^s$ **6956.** **H 555.** Big, 144°.4 (1880.40) 1*n*; 9.5...10. Double in *A. G. Leiden*.

6957. **Hd Zones.** "Star appeared elongated." I could see no sign of duplicity in 1901. $35^m\ 38^s$

[β 5...]

6958. **Σ 1867.** *Bootis* 260. There seems to be a little change in the angle, and some diminution in the distance. 35 39

1841.41	19°.6	1″.70	2*n*	Ma
1852.18	20.1	1.41	4*n*	OΣ
1869.12	17.2	1.30	4*n*	Δ
1875.95	15.9	1.30	3*n*	Sp
1876.47	15.8	1.25	3*n*	Hl
1883.43	16.0	1.19	2*n*	Hl
1884.43	17.7	1.27	3*n*	Hl
1885.38	16.1	1.19	3*n*	Hl
1904.30	13.2	1.14	2*n*	A

[Ma (*F. S.* **I**)...Ma (**IX, X**)...Se...Da 3...Δ (1207)...Δ (**I, II**)...OΣ (**IX**)... WS...WS 2...Gl...H (**V**)...Sk...Flm...Sk 2...Hl (*Wash. Obsns.* 1876, 1882, 1884–85)....Hl (**I, II**)....Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13).... Sp (**II**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Maw (**II**)...Big...Big (*Bul. Ast.* **XII**, 299)... Glasenapp (**IV**)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...Sk 5...]

6961. **Σ 1866.** Unchanged. 35 54

1865.08	199°.9	0″.83	3*n*	Δ
1875.48	200.6	0.82	2*n*	Sp
1898.40	22.7	1.16	3*n*	Doo
1902.39	20.0	0.83	3*n*	A
1903.48	200.0	0.93	2*n*	Biesbroeck

[Ma (*F. S.* **II**)...Ma (**X, XI, XIII, XV**)...Se...Se 2...Se (*Comp. Rend.* **XLVIII**, 375)...OΣ (**IX**)...Δ (1207)...Δ (**I, II**)...WS...WS 2...Gl...Sk 2...Sp (2133) ...Sp (**II**)...Per...Per (2684)...Brown (3645)...Giacomelli (**II**)...Bryant (*Mon. Not.* **LIX**, 400)...*A. G. Leipzig*, p. 209...Doolittle (*Pub. Flower Obsy.* **I**)...Biesbroeck...]

6962. **Hu 743.** With a later measure the mean is: 35 59

1903.47	24°.0	0″.41	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

6963. **OΣ 284.** No evidence of motion. The measures in Ma (XIII) appear to belong to OΣ 283. 36 6

1868.35	102°.0	7″.02	5*n*	Δ
1878.28	102.4	7.17	2*n*	β
1898.34	101.5	7.25	4*n*	Hu

[OΣ (**IX**)....Δ (**I**)....Pt....β 1....Hu (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **I, II**)...HΣ (**XII**)...Do (3930)...]

6964. **OΣ (App) 130.** B is Rad 1. 3253. No motion. 36 11

1905.29	299°.5	48″.91	1*n*	β

[Δ (**I**)...Franz (2649)...β 6...]

6965. **H 4694.** "Strongly suspected to be a close double, extremely unequal, but no time to verify." Herschel's place is the same as that of 4 *Librae*, and that is probably the star referred to. Examined several times under favorable conditions with the 6-inch (1875), and always single; and nothing was seen with the 36-inch (1890). This star may therefore be finally rejected as single. 36 17

36^{m} 22^{s} **6967.** **Σ 1869.** Without change.

1866.65	132°0	25″81	3*n*	*Δ*
1904.37	131.2	25.87	1*n*	Hu

[Ma (*F. S* **II**) ...Ma (**XIII**)....*Δ* (**II**)....Cin5.... Cin6....Wilson (Cin10).... Glasenapp (**I**)....]

36 37 **6968.** **β 807.** Discovered with the 15½-inch at the Washburn Observatory. Apparently fixed.

1888.46	237°2	1″19	3*n*	Com	8.5...9.7
1900.51	240.1	1.12	3*n*	A	8.6...9.8
1903.05	240.1	1.14	4*n*	Doo	

[*β* (**XII**) ...*β*4...Lv1...Com (**VI**)...A (*Bul. L. O.* No. 11)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

36 50 **6969.** **Hn 19.** Unchanged.

1888.43	195°3	1″64	2*n*	Com
1905.48	196.9	1.64	3*n*	Doo

[*β*4...Com (**VI**)...Innes (*Southern Double Stars*, p. 313)...]

37 ± **6970.** **H 5486.** "Place precarious." Nothing found in this place (1876). From lack of description, it is impossible to identify it with certainty.

37 1 **6971.** **Σ 1870.** Fixed.

1866.93	231°9	4″45	3*n*	*Δ*
1898.61	230.1	4.64	1*n*	Bryant

[Ma (*F. S.* **I**)...Ma (**XI, XII**)...Se...*Δ* (**II**)...WS...*β*1...Sp (**II**)...Bryant (*Mon. Not.* **LIX**, 400)...]

37 5 **6972.** **Hu 575.** The only other measure is:

1903.41	168°0	0″80	2*n*	Lewis

[Hu (*Bul. L. O.* No. 27)...Lewis (*Mon. Not.* **LXIV**, 799)...]

37 6 **6973.** **Ho 59.** Fixed.

1903.32	5°7	6″71	3*n*	Doo

[Ho (2778, 3234, 3558)...]

37 27 **6975.** **Σ 1871.** There appears to be a small advance in the angle, with no change in the distance.

1843.58	285°8	1″77	3*n*	Ma
1847.70	287.1	1.92	6*n*	OΣ
1852.67	286.5	1.82	2*n*	Ma
1857.57	287.9	1.68	2*n*	Se
1868.73	288.0	1.79	4*n*	*Δ*
1871.42	289.8	1.61	2*n*	Du
1880.63	291.5	1.75	4*n*	Je
1885.41	290.5	1.89	3*n*	Per
1891.33	292.7	1.75	3*n*	Hl
1903.38	294.2	1.83	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H1...H2...Se...Du...Flm...*Δ* (1125)...*Δ* (**I, II**)...OΣ (**IX**)...Per...Per (2748)...T (2898)...Sk3...Je (2449)...Hl (**II**)...Maw (**II**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Glasenapp (**IV**)....Brown (3645)....Bryant (*Mon. Not.* **LX**, 505; **LXI**, 486; **LXII**, 383)...HΣ (**XII**)...Boeger (*A. J.* 522)...Do (3930)...Biesbroeck...]

6977. **Σ 1872.** Fixed, but a common proper motion of 0″253 in 142°1 (Porter). 37^{m} 35^{s}

1866.82	40°1	7″54	3*n*	*Δ*
1905.11	42.0	7.52	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...H1...Ra (**XXIII**)...*Δ* (1188)...*Δ* (**I, II**)...Seagrave (*Sid. Mess.* **II**, 274)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...*β*6...]

6978. **Σ 3088** *rej.* Nothing since Struve but the following: 37 54

1905.11	101°0	29″68	1*n*	*β*6	9.0...9.7

6980. **H 5488.** "Cl. II–III. Place precarious." I could not find any pair in or near this place. 38 ±

6981. **Ⱨ N. 116.** Given in the *Synopsis* of Ⱨ's double stars, "Cl. III–IV. Unidentifiable." In the original catalogue (*Mem. R. A. S.* I) it is described "about 4° *nf θ Bootis;* the second star in the line from *θ* to this, double, 3d or 4th class, considerably unequal. Almost directly following, I believe, instead of *nf;* but the evening is bad." 38 ±

6982. **Σ 1874.** Very little, if any, change. 38 1

1868.35	288°3	25″89	4*n*	*Δ*
1878.26	288.6	26.32	1*n*	*β*
1898.12	288.0	26.40	4*n*	Doo

[Ma (*F. S.* **II**)....H (**V**)....*Δ* (**II**)....*β*1....Cin5....Doolittle (*Pub. Flower Obsy.* **I**)....]

6985. **Σ 1875.** Fixed. Dunér thought the principal star was variable. 38 51

1867.88	129°6	3″21	3*n*	*Δ*
1872.70	131.1	3.16	4*n*	Du

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...*Δ* (**II**)...Du...]

6987. **Σ 1873.** (= **Ⱨ II. 82** = **Sh 183.**) Fixed. 38 54

1867.33	94°4	6″52	4*n*	*Δ*
1895.38	92.6	6.75	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se (called Σ 1875)...*Δ* (**II**)...Pt...Cin5...O. Stone (2201)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...]

6988. **Σ 1878.** *Draconis* 59. No material change. The proper motion of A is 0″064 in 238°9 (*A. G. Hels.*). 39 3

1866.87	332°2	3″47	3*n*	*Δ*
1890.53	327.2	3.61	1*n*	HΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin5...HΣ (**XII**)...]

6989. 54 *Hydrae.* **Sh 184.** (= **Ⱨ III. 97.**) Magnitudes from H3. In some of the catalogues this is 73 *Hydrae.* The components appear to be fixed relatively, but probably form a physical system as they have a common proper motion: 39 4

Auwers	0″224 in 243°0
Porter	0.218 in 240.9

1783.03	128°2	11′28	1*n*	♅	
1835.47	134.2	9.19	3*n*	H	
1856.45	130.7	8.56	1*n*	Se	6 ...7
1879.53	130.0	8.99	4*n*	Cin	5.0...7.0
1884.39	129.2	9.03	1*n*	Wilson	6.0...7.5
1890.39	129.1	8.73	2*n*	Gla	5.8...7.1

[H^3...P^1...Se^1...J^2...Flm...Pt...Cin^3...Cin^5...Cin^6...Wilson (Cin^{10})...Glasenapp (I)....Scott (*Brit. Ast. Ass'n* **VIII**, 66)(*Mon. Not*. **LXIV**, 52)....See (3496)...*Mon. Not*. **LXI**, 597...Tebbutt (*Mon. Not*. **LXIV**, 65)...Innes (*Annals Obsy. Cape Good Hope*, Vol. **II**, Part IV)...]

$39^m 21^s$ **6990.** 5 *Librae*. **Hn 20.** Thus far no indication of change. The proper motion of 5 *Librae* is 0′041 in 278°4 (Auwers).

1889.38	249°2	2′79	3*n*	β
1905.39	246.6	2.92	5*n*	Doo

[β^4...Com (**VI**)...β (2957)(*Pub. L. O.* **II**)...]

39 38 **6992.** **H 556.** The only measures are:

1880.39	333°7	32′03	2*n*	Big	9.2...9.4

39 45 **6993.** ε *Bootis*. **Σ 1877.** (= **♅ I. 1** = **Sh 185.**) A beautiful pair, and a well-known test for small apertures. The change, if any, is very small, amounting to not more than three or four degrees in the last fifty years. The proper motion of ε *Bootis* is 0′057 in 271°0 (Auwers).

The following will be sufficient to show the past and present relation of the components:

1842.53	323°0	2′78	9*n*	Ma
1844.49	321.6	2.67	12*n*	OΣ
1859.38	326.5	2.77	7*n*	Ma
1865.86	324.8	2.71	8*n*	Δ
1873.26	329.1	2.68	4*n*	OΣ
1878.06	328.1	2.94	8*n*	Hl
1885.38	330.1	2.69	6*n*	OΣ
1887.18	326.4	2.88	11*n*	Hl
1889.43	331.8	3.03	7*n*	Giacomelli
1896.46	330.8	2.84	4*n*	Hu
1897.57	328.2	3.04	3*n*	Coleman
1903.38	330.3	2.75	3*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (303, 324, 430)...Ma (**IX, X, XI, XIII, XV**)...Bes...H^1...K...K (409, 1519)...Ek (**I, III**)...Wr...Mh (*Sid. Mess*. Sept. 1846)...Mh...P^1...P^2...Bp...Da (*Mem. R. A. S.* **V**, 139)...Da^3...Da^4...Lu (**II, III**)...Miller (863)...Miller (*Mon. Not*. **XIII**, 223)...Fl...Fl (*Mon. Not*. **X**, 192)...J^2...WJ^2...Se...Se^2...Se^3...Se (975, 1614)...Se (*Comp. Rend*. **XLI**, 271)...Bond (*Am. Acad*. **II**, 144)...Auwers (1393)...Ba (**I, II, III**)...*Gr. Obsns*. 1842, 1844....Ra (**XXII, XXVII, XXIX, XXX, XXXIII, XXXIV, XXXV**)....Flm....Amici (2155)....OΣ (**IX, X**)....Δ (1031, 1111, 1188, 1572)....Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Kn...WS...WS^2...Sk...Gl...Du...Bru...Bru^2...Pl...Pt...Pk...Hd...En (1674, 2663)...Do (*Trans. R. I. Acad*. **XXIX**, Part 13)...Do (2198, 2242, 3023, 3680)...Per...Per (2529, 2684, 2748)...de Ball (2753)...Je(2351, 2772)...Kustner(2584)...Franz(2590)...T(2866)...Hl(*Wash. Obsns*. 1880, 1884, 1886)...Hl (**I, II**)...Sp (2133)...Sp (**II**)...Ho (2978, 3234, 3558)...Hayn (3051)...β^2...β^3...Knorre, See (*Beob. Berlin*, No. 6, 1892)...Perry (*Eng. Mech*. **XXXVIII**, 192)...Big...Glasenapp (**I, III**)...Maw (**I, III, IV**)....Greenwich Obsy. (*Mon. Not*. **LIV**, 317; **LVI**, 359; **LIX**, 400; **LX**, 504, 518; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)...Big (*Bul. Ast*. **XII**, 299)...Cohn (3240)...Collins (*A. J*. 378)...Knorre (3300)...Schwarzschild (3335)...Searle (*A. J*. 299)...Hu (*A. J*. 397)...Glasenapp (**IV, V**)...Comas (3497)...Knorre (3518)....Giacomelli (**II**)....Coleman (*Mem. R. A. S.* **LIII**)....*Annals Toulouse Obsy*. **III**...HΣ (**XII**)...Boeger (*A. J*. 522)...Thiele (3837)...Sk^5...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

6995. **H 4700.** Probably fixed. $39^m 49^s$

1890.42	220°1	25′43	2*n*	Gla	9.0...9.7
1900.47	222.3	25.73	1*n*	Hu	9.0...9.5

[Glasenapp (**I**)...Hu (*Bul. L. O.* No. 44)...]

6996. **Hu 576.** Discovered at the Lick Observatory. 39 51

[Hu (*Bul. L. O.* No. 27)...Lewis (*Mon. Not*. **LXIV**, 799)...]

6997. **Σ 1876.** Very slow direct motion in angle, with no material change in distance. Hough measures a star 11 m, 302°2 : 70′66 (1891.39) 1*n*. Common proper motion in AB. 40 2

1844.34	57°2	1′24	1*n*	Ma
1856.88	60.8	1.00	2*n*	Se
1865.61	65.7	1.15	4*n*	Δ
1878.96	72.4	1.40	4*n*	Sp
1887.40	72.9	1.13	2*n*	Hl
1895.49	75.1	1.01	3*n*	Com
1903.48	80.4	1.26	2*n*	Biesbroeck
1905.38	78.6	1.08	5*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^2...Mh...Flm...Sp (**II**)...Δ (1125, 1188, 1474)...Δ (**I, II**)...Do (3023) (*Trans. R. I. Acad*. **XXIX**, Part 13)...WS...Gl...Sk...Sk^3...En (2663)...Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})...Pt...Lv^1...T (2898)...Hl (**II**)...Glasenapp (**I**)...Ho (3234)...Com (**X**)...Brown (3645)...Bryant (*Mon. Not*. **LX**, 505)...Biesbroeck...]

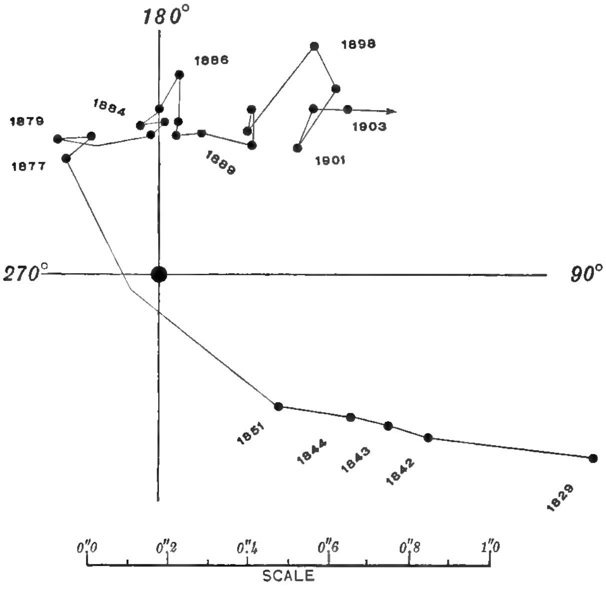
6999. **Σ 1879.** A most interesting binary. The companion has passed over a considerable part of the apparent ellipse. The components have a common proper motion of 0′288 in the direction of 165°5 (Porter). Two provisional orbits have been found: 40 23

1895	Lewis	146.9 yrs.	*Mon. Not*. LVI, 33
1903	Biesbroeck	238.0	*A. N*. 3989

The following positions are shown:

1829.99	67°3	1′18	3*n*	Σ
1842.42	59.2	0.79	3*n*	Ma
1843.37	57.2	0.69	1*n*	Ma
1844.35	54.0	0.6±	1*n*	Ma
1851.41	42.5	0.45	1*n*	Ma
1863.51	Single		1*n*	Δ
1865.31	45±	Obl.?	1*n*	Δ
1869.39	Single		2*n*	Du
1877.43	219.1	0.37:	3*n*	Sp
1878.39	206.6	0.38	2*n*	Δ
1878.44	217.1	0.42	1*n*	β
1882.50	183.5	0.35:	3*n*	Sp
1883.47	177.9	0.38:	6*n*	Sp
1884.50	187.3	0.37:	2*n*	Sp
1885.48	179.5	0.41:	4*n*	Sp
1886.51	174.2	0.50	4*n*	Sp
1887.44	173.1	0.38	3*n*	Hl
1887.49	173.1	0.35	4*n*	Sp
1889.78	163.2	0.37±	3*n*	HΣ
1895.44	144.6	0.40	2*n*	Lewis
1896.42	150.7	0.47	1*n*	Com
1897.54	147.8	0.42	3*n*	Brown
1898.17	145.8	0.69	3*n*	A
1900.40	136.4	0.64	3*n*	Doo
1901.48	132.7	0.47	2*n*	Lewis
1903.48	137.0	0.57	2*n*	Biesbroeck
1905.36	131.3	0.63	1*n*	A

It is evident from inspection that the maximum distance of the companion is very uncertain, and therefore the length of the major axis, and the form of the ellipse in the first and second quadrants must remain doubtful for a long time, and until the position-angle is less than 90°.



Σ 1879

Lewis (*Mon. Not.* LXIV, 800) measures a close pair, described as "star following" Σ 1879; the approximate R. A. is the same as Σ 1879, but 8′ north in declination. There is no star here of this magnitude in DM.

1903.34 115°9 0″18 1*n* Lewis 7.5...8.5

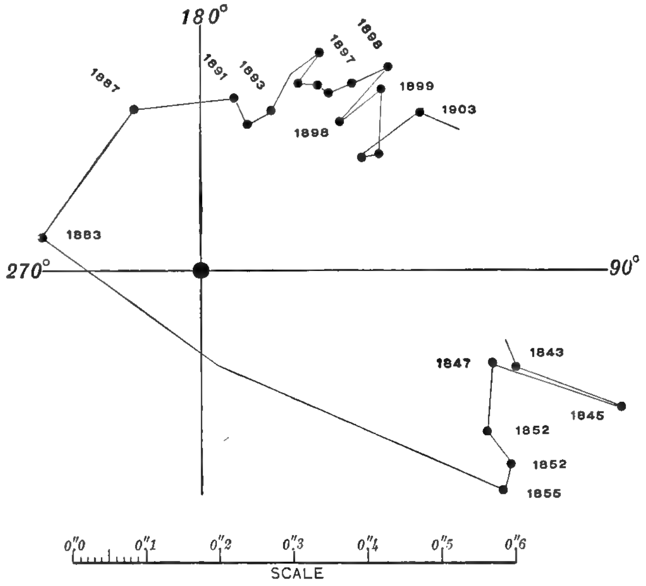
[**Ma** (*F. S.* **I**)...Ma (**X, XI, XIII**)...Hd...Du...Flm...Δ (1736)...Δ (**II**)...En (2663)...Gore (*Mon. Not.* **XLVII**, 62)...β1...Sp (**II, II** App)...Hl (**II**)...Everett (*Mon. Not.* **LVI**, 464)...Com (**X**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Biesbroeck...Greenwich Obsy. (*Mon. Not.* **LVI**, 33, 359; **LIX**, 400; **LX**, 505; **LXII**, 383; **LXIII**, 403; **LXIV**, 799)....Biesbroeck (3989)....Lohse (*Pub. Potsdam Obsy.*)...]

$40^{m}\ 59^{s}$ **7001. OΣ 285. B. A. C. 4885.** Binary. The following orbits have been found:

1891	Burnham	62.1 yrs.	*Pub. L. O.* II, 244
1892	Gore	118.57	*Mon. Not.* LIII, 373
1895	See	76.67	*Evolution of Stellar Systems*
1903	Biesbroeck	97.93	*A. N.* 3989

Many of the distance measures are somewhat doubtful, and the real period will not be certainly known until the observations cover a full revolution.

1843.32	72°6	0″45	2*n*	Ma
1845.80	72.2	0.61	3*n*	OΣ
1847.96	72.2	0.42	3*n*	Ma
1852.69	60.6	0.45	1*n*	Ma
1852.74	57.8	0.50	4*n*	OΣ
1855.84	53.9	0.51	3*n*	OΣ
1881.50	Round or doubtful			β
1883.84	258.3	0.22	5*n*	En
1885.40	225	Elong.	3*n*	Per
1887.60	202.2	0.24	4*n*	Sp
1891.30	168°7	0″24	3*n*	β
1892.30	162.2	0.21	3*n*	β
1893.45	156.0	0.24	1*n*	β
1893.47	151.3	0.34	2*n*	Wilson
1893.52	152.3	0.29	2*n*	Lv
1895.32	147.3	0.30	3*n*	See
1895.54	141.1	0.25±	3*n*	Com
1896.43	144.3	0.3	2*n*	Com
1897.22	141.1	0.33	3*n*	A
1898.32	137.2	0.38	3*n*	Hu
1898.38	136.7	0.28	2*n*	Doo
1899.33	135.2	0.34	3*n*	Lewis
1899.38	136.1	0.34	3*n*	A
1899.69	134.3	0.36	3*n*	Hu
1901.35	123.2	0.29	3*n*	Bryant
1902.56	124.9	0.27	3*n*	Bryant
1903.39	125.9	0.37	4*n*	Biesbroeck



OΣ 285

[Ma (**XI, XIII**)...Se...OΣ (**IX**)...Δ (I, p. 229)...Sk³...**Flm**...Per...Per (2749)...Sp (**II, II** App)...En (2678)...Gore (*Mon. Not.* **LIII**, 373)...β⁴...β (3114, 3142) (*Pub. L. O.* **II**)...β (*Sid. Mess.* **X**, 273) (*Ast. and A.-P.* **XII**, 586) orbit...See (*A. J.* 349, 356, 378) (*Evolution of the Stellar Systems*)...βig (*Bul. Ast.* **XII**, 299)...Everett (*Mon. Not.* **LVI**, 464)...Com (**X**)...Lv (*A. J.* 382)...Glasenapp (**IV**)...Doolittle (*A. J.* 416) (*Pub. Flower Obsy.* **I**)...A (3465, 3639)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Brown (3645)...HΣ (**XII**)...Hu (*Pub. L. O.* **V**)...Do (3930)...Biesbroeck...Biesbroeck (3989)...]

(See p. 1076)

7002. Σ 1881. Fixed. $40^{m}\ 59^{s}$

1866.62	357°4	3″50	3*n*	Δ
1905.24	359.6	3.38	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Da²...Da³...Se...Δ (**II**)...β⁶...]

7004. Σ 1882. *Draconis* **60.** (= **H III. 61.**) Fixed. 41 5

1865.76	0°9	11″46	3*n*	Δ
1905.12	0.9	11.29	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1209)...Δ (**I, II**)...Seagrave (*Sid. Mess.* **II**, 274)...β⁶...]

(See p. 1076)

$41^m\ 21^s$ **7005.** **β 1113. B. A. C. 4886.** Discovered with the 36-inch. The magnitude in DM is 7.7.

1898.39	136°0	4″37	2*n*	β	7.0...12.0
1898.40	136.4	4.14	3*n*	A	6.0...12.0
1901.39	134.2	4.44	3*n*	Doo	

[β (**XVI**) .... β (2956) (*Pub. L. O.* **II**) .... A (3585) .... Doolittle (*Pub. Flower Obsy.* **II**)...]

41 50 **7006.** **β 346.** *Librae* 23. Discovered with the 6-inch. Lalande 26940. Decided change in angle. These are all the measures:

1877.41	236°2	1″23	2*n*	Cin
1877.44	236.1	1.27	2*n*	Δ
1879.34	233.2	1.27	1*n*	Cin
1880.98	239.2	1.18	2*n*	Sp
1888.35	233.4	1.27	3*n*	T
1902.51	250.1	1.40	5*n*	Doo
1904.36	253.6	1.35	2*n*	A
1905.28	252.3	1.62	4*n*	Doo

[β (**VI**)...β (2062)...Δ (**I**)...Cin^{4}...Cin^{5}... Sp (**II**)...T (2991)... Doolittle (*A. J.* 547)...A (*Pub. A. S. P.* **XVI**, 144)...]

42 9 **7008.** **Ho 263.** No measures by Hough. Doolittle found it single on four nights in 1903–4.

[Ho (2977, 3558)...]

42 23 **7009.** **β 617.** (AB = **H VI. 117 = S 663.**) The smaller star of Herschel's wide pair was found to be double with the 18½-inch. The measures show no change in the last twenty years. All the later measures of AB are given. There would seem to be an increase in the distance. There is an error of 16′ in the declination of this star in H.

B and C

1880.38	337°2	2″14	2*n*	Cin	8.8...11.5
1897.50	335.3	2.57	1*n*	See	8 ...11.2
1898.39	334.5	2.52	3*n*	A	8.3...11.2
1901.41	337.0	2.67	3*n*	Doo	

A and B

1878.34	219°5	59″44	2*n*	β	6.5...
1898.39	219.8	60.44	3*n*	A	6.2...
1901.40	220.2	60.73	4*n*	Doo	

[β (**X**)...β^{1}...Cin^{6}...See (3496)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

42 45 **7012.** *μ Librae.* **β 106.** The close pair was discovered with the 6-inch, the distant star E with the 18½-inch, and the faint companions, C and D, added with the 36-inch. The large star has a proper motion of 0″097 in the direction of 260°6 (Auwers), and it is obvious that this belongs to both components. It is probable that the distant companions are not attached to the binary.

A and B

1876.99	335°1	1″53	7*n*	Sp
1878.32	333.2	1.50	1*n*	β
1883.43	337.4	1.51	6*n*	En
1886.39	337°2	1″52	4*n*	T
1889.38	340.6	1.61	3*n*	β
1889.46	339.6	1.84	4*n*	T
1897.29	343.5	1.84	2*n*	Doo
1897.41	340.2	1.57	3*n*	A
1898.55	339.6	1.59	3*n*	A
1903.42	342.6	1.48	5*n*	Jouffray

A and C

1898.52	281°6	17″98	2*n*	A

A and D

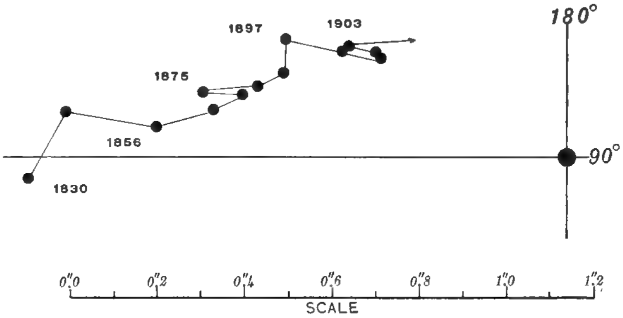
1898.52	184°8	26″20	2*n*	A

A and E

1889.38	232°5	27″19	3*n*	β
1898.51	232.8	27.46	2*n*	A

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β^{1}...β (2957) (*Pub. L. O.* **II**)...WS^{2}... Δ (**I**)...Δ (2081) ... Sp (**II**)...Cin^{4}...Cin^{5}...En (2678)...Wilson (Cin^{10})... T (2866, 3186)...Lv^{1}...Lv (*Sid. Mess.* **VIII**, 77)...Glasenapp (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...A (3465, 3585)...Scott (*Mon. Not.* **LIX**, 427; **LXIV**. 52)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

7013. **Σ 1883.** Slow retrograde motion, and practically rectilinear so far as the measures are concerned. In a few years it will be a close pair, and will probably prove to be a physical system. The following selected epochs will be sufficient to show the change to this time: $42^m\ 56^s$



Σ 1883

1830.37	272°0	1″24	3*n*	Σ
1843.18	264.7	1.16	4*n*	OΣ
1856.41	265.6	0.95	2*n*	Se
1864.12	262.2	0.82	5*n*	Δ
1865.39	258.9	0.76	2*n*	Δ
1875.83	259.9	0.85	5*n*	Sp
1879.46	257.2	0.73	3*n*	Hl
1885.42	253.5	0.68	6*n*	Hl
1897.16	244.9	0.57	3*n*	A
1897.80	247.6	0.70	5*n*	Doo
1901.01	241.8	0.49	7*n*	Bryant
1903.49	243.3	0.56	3*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**X, XI, XV**) ... H^{1} ... H^{2} ... H (**IV, VI**) ... Se ... Flm ... OΣ (**IX**).... Δ (1188, 1474)... Δ (**I, II**)...Sp (2133)...Sp (**II**)...WS...Gl...Sk .... Sk^{2}.... Hl (*Wash. Obsns.* 1884, 1886).... Hl (**I, II**) .... Do (2307, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Per....Per (2748)....En (2663).... T (2866)...Ho (2978)...Big (*Bul. Ast.* **XII**, 299)...A (3465)...Brown (3645) ....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)...Coleman (*Mem. R. A. S.* **LIII**)...Glasenapp (**V**).. Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Biesbroeck...]

43^{m} 4^{s} **7014.** Σ 1884. Without change, but a common proper motion of 0″156 in 299°5 (*A. G. Berlin*).

1868.94	55°0	1″50	6*n*	Δ
1893.49	53.1	1.33	2*n*	Ho
1903.36	55.1	1.52	2*n*	Do

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...H (**V**)...Da³...OΣ (**IX**)...Se...Se² ....Δ (1125, 1188)....Δ (**I, II**)....WS....Gl....Per....Per (2684, 2748).... T (2866)...Ho (3234)...Maw (**II, III**)...Glasenapp (**IV**)...Brown (3645)... Greenwich Obsy. (*Mon. Not.* **LX,** 505)...Do (3930)...Coleman (*Mem. R. A. S.* **LIV**)...]

43 43 **7016.** **Ho 546.** The following is the only later position:

1903.33	89°2	2″91	3*n*	Doo

[Ho (3557)...]

44 12 **7018.** *α Librae.* **Sh 186.** The smaller star is 8 *Librae*. The proper motions are nearly the same (Auwers):

α Librae = 0″147 in 243°4
8 *Librae* = 0.143 in 241.5

The only recent measure is:

1901.29	314°1	231″02	2*n*	β

The large star was found to be a spectroscopic binary by Slipher (*Bul. Lowell Obsy.* No. 11).

[Lu (**III**)...β⁵...]

44 25 **7019.** Σ 1885. (= Ħ I. 78.) Without change.

1868.07	144°3	3″79	4*n*	Δ
1899.40	144.1	3.73	1*n*	Bryant

[Ma (*F. S.* **I**)...Ma (**XI**)...Ma (304)...Wn (**V**)...Wn (1738)...Se...Δ (**II**)... Bryant (*Mon. Not.* **LX,** 505)...*Annals Toulouse Obsy.* **III**...]

44 28 **7020.** **H 2748.** (= Ħ N. 48.) No measures by Ħ. By a rough measure in 1874 I found P = 177°0. There is a third star at 225° about twice the distance of B. The only other observation since Herschel is from the Kirkwood Observatory:

1904.49	178°0	18″23	3*n*	Miller

44 42 **7022.** **Ho 388.** A later position is:

1903.26	124°3	12″00	3*n*	Doo

[Ho (3233)...]

44 47 **7023.** **Kr 43.** Noted as "double" by Krueger in *A. G. Hels.* Unchanged.

1898.46	214°1	2″72	6*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

44 48 **7024.** **H 5489.** Hall could not see any star in this place, but measured a faint star, 206°8 : 56″25 (1876.89) 2*n*, called 16 m. I measured a more distant star with the 18½-inch in 1878, but could not see either the Herschel or the Hall star. Examined with the 36-inch (1890.36), and nothing seen nearer than the Hl star, which appeared to be 14 m. One of these, and probably the most distant one, seems to be the star seen by H, and error in his distance, or change from proper motion. On two nights in 1903 I could not see the Hall star with the 40-inch. The measures of the more distant star are:

1878.34	23°0	112″56	1*n*	β	
1903.13	23.0	112.07	2*n*	β	6.6...11.5

[β¹...Hl (**I**)...β⁶...]

45^{m} 7^{s} **7026.** **Hu 647.** Measured since Part I was in type.

1904.33	84°0	0″38	3*n*	Hu	9.0...9.3

[Hu (*Bul. L. O.* No. 57)...]

45 15 **7027.** Σ 1886. Fixed. No. 11 of the list of new pairs in (Ma XI) is identical with this. The place in Ma is erroneous, and the position-angle is reversed. (See No. 7052.)

1865.66	228°2	7″67	3*n*	Δ
1885.81	226.7	7.84	5*n*	Per

[Ma (*F. S.* I)...Ma (**XI,** pp. 18, 74)...Se...Du...Δ (**II**)...Per...Per (2748)... *A. G. Leipzig*, p. 209...]

45 19 **7028.** OΣ 286 *rej.* Entered in the *Poulkowa Catalogue* of 1843 as possibly a close pair, and two discordant angles are given in Ma (XI, XIII). Single to Δ (I) in 1865, and to Hu (*Pub. L. O.* V) in 1898 with the 36-inch. There is no probability of its being really double.

45 31 **7029.** **H 5490.** "Two double stars, or one quadruple, very near each other. Place very precarious." There is nothing of the kind in this place. H 5486 and 5488 are also missing. The absence of a full description makes it difficult to identify.

45 37 **7031.** 39 *Bootis.* Σ 1890. (Ħ **II.** 79 = **Sh** 188.) The components are relatively fixed, but have a common proper motion of 0″104 in 316°4 (Auwers).

1866.91	45°0	3″54	3*n*	Δ
1885.41	43.4	3.43	3*n*	Per
1890.33	44.6	3.53	5*n*	Giacomelli
1898.51	43.8	3.43	3*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII**)...Bp...Wr...Wr (*Phil. Trans.* 1851)... P¹...P²...Da³...Ra (**XXII, XXIX**)...Se...H (**V**)...Mh...En (1518, 1674) ...OΣ (**IX, X**)...Δ (*Mem. Accad. Sci.*)...Δ (1031)...Δ (**I, II**)...Ba (**II, III**)...Du...Pl...WS...Gl...Je (2351)...Kustner (2584)...Per...Per (2529, 2748)...T (2898)...Glasenapp (**III, V**)...Knorre (3518, 3632)...Coleman (*Mem. R. A. S.* **LIV**)...Giacomelli (**II**)...]

45 39 **7032.** Σ 1889 *rej.* The large star is given a proper motion of 0″057 in 145°4 (*A. G. Harvard*). The only measure is:

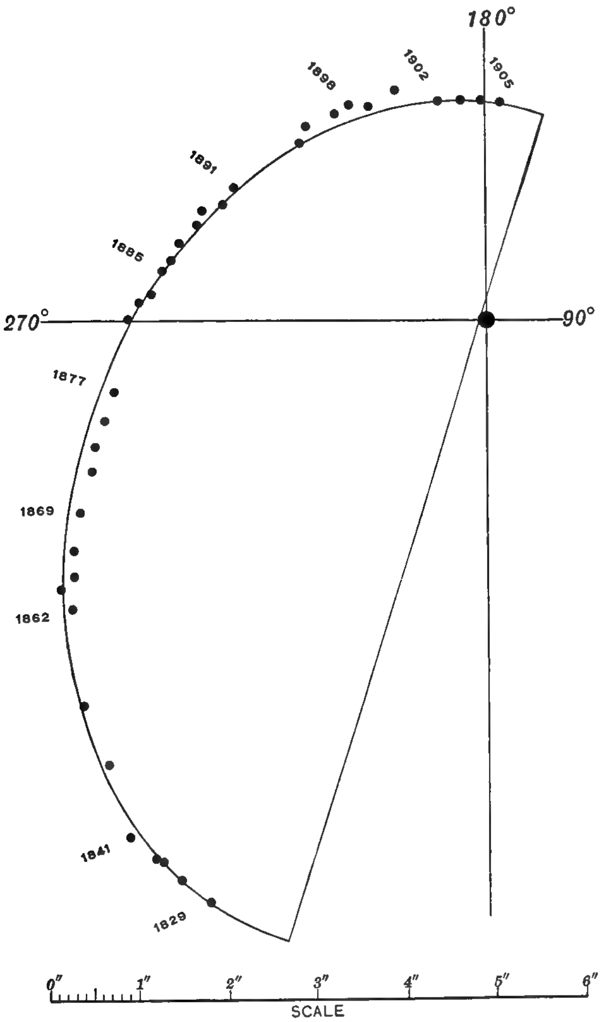
1900.34	87°6	16″14	2*n*	Espin (3717)

(See p. 1076)

$45^m\ 51^s$ **7034.** ξ *Bootis.* Σ 1888. (= H II. 18 = Sh 187.) An interesting binary system, but not in rapid motion. The components have a considerable proper motion, which is given from meridian observations:

Auwers	0″.161 in 128°.8
Bossert	0.153 in 113.0

Many attempts have been made in the last fifty years to find the elements of the orbit with more or less varying and inconsistent results, and at this time, with the accumulation of additional material, one is perhaps as likely as another to turn out to be approximately correct. The observations before Struve are too uncertain to be of any value in such an investigation, and the known path of the companion along the apparent ellipse is at this time less than 160°. Many very different ellipses will represent even the best of the measures practically as well, or with errors in the observed positions as small as they would ordinarily be in the most careful micrometrical work. For some years there will probably be but little change in distance, and, by the time the companion has reached the middle of the second quadrant, the apparent ellipse should be well defined. Then, by disregarding all positions prior to Struve, and rejecting the greater portion of the measures since that time, the elements of the orbit can be determined within very narrow limits.



ξ Bootis. Σ 1888

The following orbits have been found, the first column giving the date of the last measure used in the computation:

1833	Herschel	117.14 yrs.	*Mem. R. A. S.* VI, 149
1853	Madler	160.69	*Dorpat Obsns.* XIII, 174
1872	Hind	168.91	*Mon. Not.* XXXII, 250
1872	Winogradsky	140.64	*Mem. de l'Université de Kasan*, 1872–73
1876	Doberck	127.97	*A. N.* 2118
1877	Doberck	127.35	*A. N.* 2129
1895	See	128.0	*Evolution of Stellar Systems*
1901	Comstock	172	*A. J.* 503
1902	Doberck	140.84	*A. N.* 3900
1904	Biesbroeck	148.46	*A. N.* 3989

The following selected positions, commencing with Struve in 1829, are given on the diagram. The ellipse shown gives a period of about 175 years, but it does not follow, for the reasons stated, that the final orbit will have this form.

1829.46	334°.2	7″.22	4*n*	Σ
1832.40	331.1	7.14	2*n*	Σ
1835.43	329.0	7.07	5*n*	Σ
1836.47	328.2	7.09	4*n*	Σ
1841.06	325.1	7.03	5*n*	OΣ
1847.82	319.4	6.53	3*n*	OΣ
1853.54	313.4	6.23	3*n*	OΣ
1862.02	304.5	5.68	9*n*	OΣ
1863.56	302.0	5.67	5*n*	OΣ
1864.87	301.6	5.44	16*n*	Δ
1866.86	299.0	5.30	11*n*	Δ
1869.38	295.2	5.04	10*n*	Δ
1871.82	290.9	4.75	9*n*	Δ
1873.91	287.8	4.62	8*n*	Δ
1875.90	284.7	4.43	8*n*	Δ
1877.93	280.9	4.26	8*n*	Δ
1881.91	269.8	4.01	6*n*	Hl
1883.43	267.1	3.90	3*n*	Hl
1884.43	265.9	3.78	3*n*	Hl
1885.37	261.4	3.68	3*n*	Hl
1886.43	259.3	3.59	3*n*	Hl
1887.43	256.0	3.54	3*n*	Hl
1888.42	251.9	3.40	3*n*	Hl
1889.48	249.1	3.40	3*n*	Hl
1890.43	246.3	3.21	3*n*	Hl
1891.45	242.4	3.18	3*n*	Hl
1895.49	226.4	2.88	3*n*	Com
1896.47	222.8	2.95	4*n*	Hu
1897.38	216.2	2.85	10*n*	Doo
1898.08	212.3	2.86	3*n*	A
1899.21	208.7	2.72	3*n*	A
1901.40	201.4	2.77	2*n*	Lewis
1902.36	192.0	2.50	3*n*	A
1903.44	186.3	2.49	14*n*	Doo
1904.33	181.1	2.48	3*n*	Biesbroeck
1905.15	176.0	2.47	3*n*	β

[Ma (*F. S.* **I**) . . . Ma (304, 430) . . . Ma (**IX, X, XI, XIII, XV**) . . . Σ1 . . . H (**V, VII**) . . . H (*Mem. R. A. S.* **VI**, 149) . . . H1 . . . H2 . . . Ek (**I**) . . . Mh . . . Bes . . . Miller (848) . . . Auwers (1393) . . . P1 . . . P2 . . . Se (975, 1614) . . . Se (*Comp. Rend.* **XLI**, 271) . . . Se . . . Se2 . . . Se3 . . . K . . . K (409, 1519) . . . *Durham Obsns.* 1846–48 . . . Bp . . . Wr . . . Fl . . . Da2 . . . Da3 . . . Da4 . . . Hd . . . Lu (**I, II, III**) . . . Hind (*Mon.*

Not. **IX**, 144: **XXXII**, 250)...Wh...Ra (**XXII, XXVII, XXVIII, XXIX, XXX, XXXI, XXXIII, XXXIV, XXXV, XXXVIII, XXXIX, XLVII**)...Ba (**I, II, III, IV**)....En (1518, 1674, 2663, 2742, 2786)....Wn (**V**)....Wn (1738)....Amici (2155)...Du...Flm...Do (2118, 2129, 2198, 2242, 2433, 3023, 3680, 3900, 3930) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Nobile (*Rend. della R. Accad. Sci.*, Napoli, Nov. 1875)...OΣ (**IX, X**)...Δ (*Mem. Accad. Sci.*)...Δ (1031, 1111, 1188, 1474, 1572, 1735, 1798, 1886, 1979, 2079, 2193)...Δ (**I, II**)...WS...WS²...Gl...Sk...Sk²...Sk³...Sk⁴...Sk⁵...Pl...Pk...Pt...Je (2351, 2449, 2772)...Bru²....Goldney (2257)... Perry (*Eng. Mech.* **XXXVIII**, 192)....Per....Per (2559, 2684, 2748)....de Ball (2753)....Hl (*A. J.* 301)....Hl (*Wash. Obsns.* 1880–86)....Hl (**I, II**)....Kustner (2584)....Franz (2590)....Sp (2133)....Sp (**I, II, II** App.)...T (2866)...Seagrave (*Sid. Mess.* **II**, 258)...Lv (*A. J.* 278)...Jones (*A. J.* 312)...Hayn (3051)...See (*Beob. Berlin*, No. 6, 1892)...*Proc. Haverford Coll. Obsy.* 1891, 1892...Glasenapp (**I. III, IV**)...Ho (3234)...Maw (*Observatory* **XII**, 156; **XIII**, 357)...Maw (**I, II, III, IV**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIV**, 800)....Cohn (3240)....Searle (*A. J.* 299)....Big....Big (*Bul. Ast.* **XII**, 299)...Everett (*Mon. Not.* **LVI**, 464)...Collins (*A. J.* 378)...See (*A. J.* 359, 378)...Com (**X**)...Giacomelli (**II**)...Knorre (3300)...Hu (*A. J.* 397)...Doolittle (*A. J.* 416)....Lv (*A. J.* 407)....Brown (3645)....Coleman (*Mem. R. A. S.* **LIII, LIV**)...A (3585, 3639)...Gl (*Mon. Not.* **LXI**, 556)...*Annals Toulouse Obsy.* **III**....HΣ (**XII**)....Com (*A. J.* 503)....Doolittle (*A. J.* 547, pp. 176, 177) (*Pub. Flower Obsy.* **I**)....Lau (*Bul. Ast.* **XXII**, 238)....Biesbroeck...Biesbroeck (3989)...β⁶...Lohse (*Pub. Potsdam Obsy.*)...]

46ᵐ 39ˢ **7038.** **Ho 389.** The later measures give a larger distance and smaller angle.

1899.49	94°3	1″52	1*n*	A
1903.43	94.2	1.41	2*n*	Do
1904.00	94.9	1.40	3*n*	Doo

[Ho (3234)...A (3639)...Do (3931)...]

46 46 **7039.** **Hn 120.** No other measures.

[Hn (*Washburn Obsns.* **II**)...Com (**VI**)...]

(See p. 1076)

46 59 **7040.** **β 31.** The close pair was discovered with the 6-inch, and C subsequently added with the 18½-inch. The principal star has some proper motion:

Porter	0″223 in 343°0
A. G. Berlin	0.230 in 347.9

The measures show conclusively that the movement is common to the three components, and there can be no doubt that they constitute a physical system. There is slow direct angular motion in the close pair, and, perhaps, some change in the direction of C. This triple is about 31′ *sf* ξ *Bootis*. Some of the later measures are:

A and B

1878.82	188°1	1″35	2*n*	β
1883.71	193.2	1.51	5*n*	En
1890.35	190.3	1.40	3*n*	β
1893.26	192.7	1.35	5*n*	Sp
1896.46	192.1	1.57	4*n*	A
1896.91	194.3	1.48	4*n*	Lewis
1900.87	196.4	1.50	7*n*	Doo
1901.94	194.9	1.48	4*n*	Lewis
1903.51	195.6	1.42	2*n*	Biesbroeck

A and C

1890.35	162°7	9″03	3*n*	β
1898.46	166.0	9.05	1*n*	Lewis
1902.50	163.3	9.13	1*n*	Lewis

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β¹...β³...β (3048) (*Pub. L. O.* **II**)...Δ (**I**)....En (2678)....Sp (**III**)....A (3395)....Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)....Do (3930)....Doolittle (*Pub. Flower Obsy.* **I, II**)....Biesbroeck....Lohse (*Pub. Potsdam Obsy.*)...]

7041. **β 118.** Discovered with the 6-inch. Without change. It is 2½ᵐ *f* and 28′ *s* of α *Librae*. The following are all the later measures: 47ᵐ 1

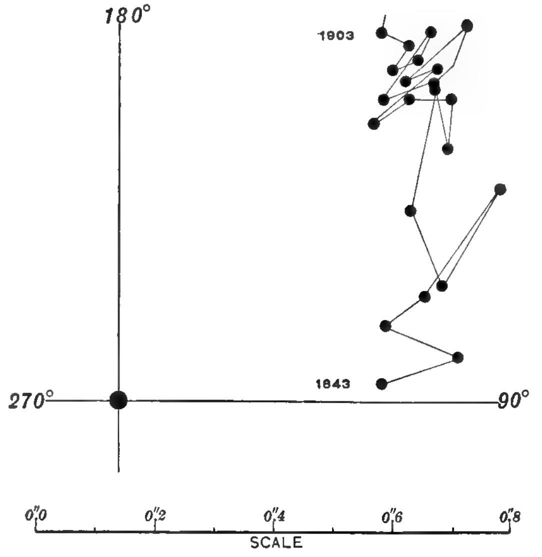
1879.87	306°1	1″86	2*n*	Cin
1886.30	308.6	1.95	1*n*	LM
1888.35	306.4	1.59	2*n*	T
1901.82	308.4	1.84	4*n*	Doo
1904.36	305.3	1.57	1*n*	A

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...Cin⁵...Cin⁶...LM...T (2991)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7043. **H 2752.** "Fine. No. 10 of the list of new pairs in Ma (XI) is identical with this. No evidence of change. In DM 7.3m. 47 4

1843.32	126°3	5″44	2*n*	Ma	7.5...9.5
1878.26	126.5	5.84	1*n*	β¹	8.0...10.5

7044. **OΣ 287.** The measures, taken together, are much too uncertain to disclose the character of the relative motion. So far as the observations are concerned, it is practically rectilinear. The following positions are shown on the diagram: 47 8



OΣ 287

1843.32	93°8	0″45	1*n*	Ma
1845.51	97.3	0.58	2*n*	OΣ
1852.74	105.5	0.47	4*n*	OΣ
1855.84	108.4	0.55	3*n*	OΣ
1868.56	119.0	0.74	1*n*	OΣ
1868.60	119.5	0.58:	5*n*	Δ
1877.92	123.1	0.59:	4*n*	Sp
1883.15	134.4	0.75	7*n*	En
1883.50	127.4	0.70	2*n*	Per
1885.41	132.3	0.76	2*n*	Per
1887.46	136.1	0.71	2*n*	Hl
1887.56	137.4	0.64	4*n*	Sp
1889.01	136.1	0.78	5*n*	HΣ
1891.66	138.1	0.73	3*n*	Maw

1893.98	137°.1	0″.87	2*n*	Big
1895.38	135.2	0.76	2*n*	Gla
1897.47	138.7	0.68	1*n*	Brown
1898.32	139.9	0.82	3*n*	Hu
1900.45	138.6	0.77	2*n*	Bryant
1900.48	140.3	0.73	3*n*	Doo
1901.96	140.7	0.78	7*n*	Bryant
1903.40	144.6	0.77	4*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX**)... Flm...Δ(I)...Do (2307)... Per... Per (2529, 2749) ...En (2678)... Hl (**II**) ... Maw (**I, III**)... Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LX**, 505; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)...Sp (**II, II** App) ...Big...Big (*Bul. Ast.* **XII**, 299)...Sk³...Sk⁴...Sk⁵...Glasenapp (**IV, V**)... Brown (3645)....Hu (*Pub. L. O.* **V**).... Doolittle (*Pub. Flower Obsy.* **I**).... HΣ(**XII**)...Do (3931)...Biesbroeck...]

(See p. 1076)

47m 18s **7046.** **β 347.** *Centauri* 330. Discovered with the 6-inch. B. A. C. 4912. The measures of C indicate a small proper motion.

A and B

1890.43	319°.9	13″.47	1*n*	Gla
1897.39	318.	12.94	2*n*	A

A and C

1890.43	243°.1	58″.34	2*n*	Gla
1897.39	242.8	58.04	2*n*	A

[β (**VI**)...β (2062, 2957) (*Pub. L. O.* **II**)...Glasenapp (I) (*A. J.* 241)...A (3465)... Scott (*Mon. Not.* **LXIV**, 52)...]

47 29 **7047.** **β 942.** Discovered with the 18½-inch. Not in the DM. It is 187″ from the wide pair, OΣ (App) 131, in the direction of 221°.5. This wide pair is:

1873.44 210°.5 89″.69 2*n* Δ 6.5...7.2

The following, which are all the later measures of the close pair, show no change:

1892.30	191°.2	1″.26	3*n*	β
1892.38	189.8	1.02	4*n*	Lv
1897.44	200.1	0.94	1*n*	Lewis
1902.91	190.7	1.09	3*n*	Doo

[β (**XIII**)....β³....β (3142) (*Pub. L. O.* **II**)....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)....Lewis (*Mon. Not.* **LIX**, 400)....Doolittle (*Pub. Flower Obsy.* **II**)...]

47 40 **7048.** **OΣ (App) 131.** Lalande 27118 and 27113. There seems to be a small proper motion in one of these stars.

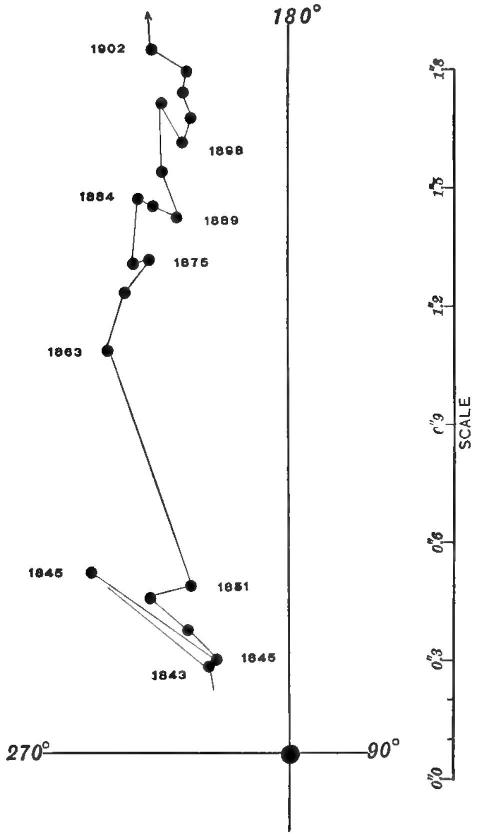
1873.44	210°.5	89″.69	2*n*	Δ
1884.0	210.5	89.16		*A. G. Albany*
1895.40	211.3	88.70	2*n*	Gla
1903.46	211.7	88.28	3*n*	β

[Δ (I)...Glasenapp (**IV**)...β⁶...]

47 46 **7049.** **OΣ 288.** The motion for sixty years has been apparently rectilinear and uniform, but some of the distances are not very accordant. It may prove to be a physical pair. The proper motion is 0″.017 in 304°.8 (*A. G. Berlin*).

The following selected positions are shown on the diagram:

1843.30	224°.1	0″.3±	2*n*	Ma
1845.35	228.0	0.68	3*n*	OΣ
1845.38	218.9	0.3±	2*n*	Ma
1846.82	220.1	0.4±	2*n*	Ma
1848.96	222°.5	0″.53	2*n*	OΣ
1851.40	210.7	0.49	3*n*	Ma
1863.44	204.5	1.12	3*n*	OΣ
1870.13	199.7	1.24	6*n*	Δ
1875.45	196.0	1.30	4*n*	Sp
1879.50	197.8	1.30	3*n*	Hl
1884.42	195.2	1.45	5*n*	Per
1887.47	194.0	1.43	6*n*	Sp
1889.46	192.0	1.39	8*n*	HΣ
1891.16	192.5	1.51	3*n*	Maw
1893.47	191.3	1.68	2*n*	Lewis
1898.33	190.2	1.57	3*n*	Hu
1899.61	189.0	1.63	3*n*	Doo
1900.42	189.2	1.70	2*n*	Lewis
1901.15	188.7	1.75	3*n*	Doo
1902.07	191.2	1.82	5*n*	Bowyer



OΣ 288

[Ma (**XI, XIII**)...OΣ (**IX**)... Da³... Do (3023, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13)...WS...WS²... Sk... Sk³... Flm... Δ (**I**)...Per...Per (2685, 2749) ...En (2678)...Pl...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Hayn (3051)...Sp (2133)... Sp (**II, II** App)... Maw (**I, III, IV**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... Schwarzschild (3335) ... Glasenapp (**IV**)...Brown (3645).... Coleman (*Mem. R. A. S.* **LIII, LIV**) .... Hu (*Pub. L. O.* **V**).... Doolittle (*Pub. Flower Obsy.* **I, II**).... HΣ (**XII**).... Boeger (*A. J.* 522).... Biesbroeck..]

(See p. 1076)

7051. **Ho 390.** The only later measure is: 48m 23s

1903.33 167°.5 23″.90 3*n* Doo

[Ho (3233)...]

$48^{m}\ 37^{s}$ **7052.** **Ma —.** From list of new pairs in Ma (XI). There is error in this place. It is identical with Σ 1886. (See No. 7027).

48 57 **7053.** **Hn 21.** No motion.

1888.40	21°5	3″79	3*n*	Com
1903.01	21.0	3.71	3*n*	Doo

[β^4...Lv^1...En (2678)...Com (**VI**)...]

49 22 **7055.** **H 4716.** Without change.

1879.47	357°6	3″27	1*n*	Cin	9.0...10.0
1897.50	357.8	3.03	1*n*	See	8.5... 9.5

[Se^1...Cin^5...Cin^6...Wilson (Cin^{10})...See (3496)...]

49 27 **7056.** **H 1259.** Nothing since Herschel but the following:

1903.44	82°5	35″14	2*n*	β^6	7.0...10.9

49 32 **7057.** **Σ 1892.** Fixed.

1867.15	241°8	2″82	3*n*	Δ
1905.28	239.4	2.74	1*n*	β

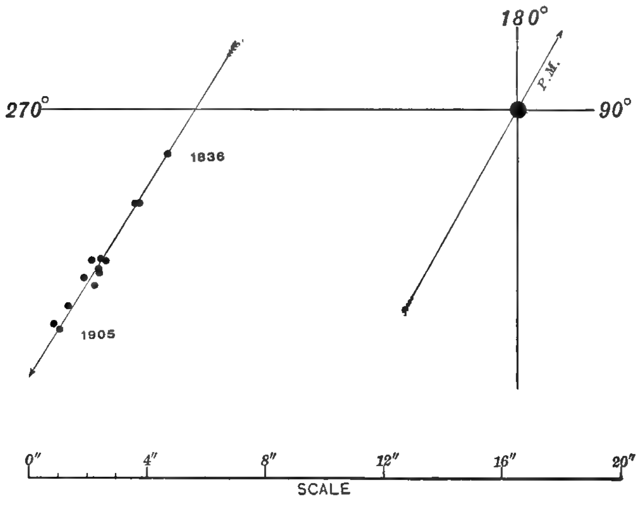
[Ma (*F. S.* I)...Ma (**XI**)...Se...Δ (**II**)...β^6...]

49 37 **7059.** **Σ 1891.** No material change.

1868.13	234°9	3″55	4*n*	Δ
1871.32	235.8	3.37	2*n*	Du
1899.40	239.2	3.74	1*n*	Bryant

[Ma (*F. S.* I)...Ma (**XI**)...Se...Se^2...Δ (**II**)...Du...Bryant (*Mon. Not.* **LX.** 506)...]

50 27 **7060.** **Sh 190.** (= **H** N. 28.) C from H (V). The principal star has a large proper motion of 2″064 in the direction of 150°5 (Porter). The companion is moving in space in almost exactly the same direction, but with an annual rate of about 0″10 less than the other. These stars form a system very similar to that of 61 *Cygni*, the components in each case having slightly different apparent velocities in space.



Sh.190

The following measures of AB are shown on the diagram:

1836.66	277°4	12″08	1*n*	H
1856.37	284.0	13.34	2*n*	J
1862.41	283.9	13.51		Main
1877.37	290.2	14.98	1*n*	Cin
1878.36	290.8	15.33	4*n*	β
1878.42	290.3	15.02	1*n*	Δ
1879.50	289.2	15.40	3*n*	Hl
1880.41	289.6	15.15	2*n*	β
1881.36	291.3	15.38	5*n*	β
1884.44	291.2	15.90	3*n*	Hl
1885.83	292.5	15.66	2*n*	Wilson
1896.40	293.6	16.76	1*n*	Com
1903.25	294.6	17.47	3*n*	Doo
1905.30	295.4	17.30	3*n*	β

The faint star first observed by H is now very distant in consequence of the proper motion of AB. There are other faint stars in the field nearer, now, than C of H. That star is F of the following measures:

AC	1878.32	171°0	52″5	1*n*	β
AD	1878.32	52.5	69.4	1*n*	β
	1905.28	16.6	92.07	1*n*	β
AE	1878.32	166.5	105.5	1*n*	β
	1905.34	183.7	54.93	2*n*	β
AF	1878.32	322.2	121.6	1*n*	β
	1886.38	322.9	138.07	1*n*	Wilson
	1905.28	324.1	175.98	1*n*	β

[H (**V, VIII**)...H^3...J^3...Da^4...Main (*Mon. Not.* **XXII**, 287)...Ra (**XXII**)...Flm...Δ (**I**, p. 355)...Hl (*Wash. Obsns.* 1884)...Pt...Hl (**I, II**)...Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})...β^1...β^3...β^4...Com (**X**)...Searle (*A. J.* 299)...Innes (*Mon. Not.* **LXI**, 416)...Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **II**)...β^6...]

7061. **H 1261.** "A neat star." $50^{m}\ 42^{s}$

1901.35	16°3	9″13	2*n*	Espin (*Mon. Not.* LXIV, 678)

7063. **A. G. 196.** Both stars given in *A. G. Camb.* Measures by Espin (3717). 50 52

7065. **OΣ 289.** Probably without change. 51 1

1868.70	114°6	4″51	4*n*	Δ
1880.39	113.2	4.28	3*n*	β
1898.34	113.2	4.84	3*n*	Hu
1903.35	111.9	4.70	3*n*	Do

[OΣ (**IX**)...Δ (**I**)...Hl (*Wash. Obsns.* 1880)...H (**II**)...β^3...Pt...Per...Per (2685)...Flm...Ho (2978, 3234)...Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3931)...]

7066. **Σ 1893.** The measures are discordant, but some change in the position-angle is shown. 51 10

1844.41	257°9	19″36	1*n*	Ma
1845.49	256.7	20.76	2*n*	Ma
1852.51	255.8	20.13	1*n*	Ma
1865.40	252.1	20.11	5*n*	Δ
1879.30	247.8	19.98	1*n*	β
1888.52	245.1	19.80	2*n*	HΣ
1903.25	240.4	19.82	2*n*	Do

[Ma (*F. S.* I)...Ma (**XI**, p. 127)...Ma (**XIII, XV**)...Δ (1572)...Δ (**II**)...Flm...Sk^3...Big...β^3...HΣ (**XII**)...Do (3931)...Furner and Storey (*Mon. Not.* **LXIV**, 446)...]

51m 12s **7067.** **H 1260.** The only measures are:

1900.42	180°.4	14″.58	2*n*	Espin (3717)

51 23 **7068.** 1 *Serpentis.* **H VI. 51.** The identity in H is uncertain, but noted, "probably 2 *Serpentis.*" It is not that star, and there is no doubt that 1 *Serpentis* is the star referred to. It has a 10m star of Class VI in the direction of 220° (1876). The only measures are:

1903.45	223°.6	85″.79	3*n*	β^6	6.5...9.4

The large star has a proper motion of 0″.026 in 103°.2 (Auwers).

51 29 **7069.** **Hu 648.** With a later measure the mean is:

1903.44	133°.4	1″.59	2*n*	Hu	8.8...13.5

[Hu (*Bul. L. O.* No. 57)...]

51 33 **7070.** 59 *Hydrae.* **β 239.** Discovered with the 6-inch. The angle is increasing, but the motion is very slow. The distance seems to have remained practically constant. Auwers gives the proper motion of this star, 0″.085 in the direction of 234°.8. It is evident from the measures that this movement is common to the components.

The following are some of the measures:

1878.36	309°.5	0″.93	1*n*	β	6.0...6.0
1878.96	312.6	0.77	2*n*	Sp	6.0...6.0
1879.92	311.8	0.83	2*n*	β	6.0...6.2
1880.38	307.4	0.90	4*n*	Cin	6.2...6.7
1881.40	312.0	1.07	4*n*	β	6.0...6.0
1889.44	311.4	0.86	3*n*	β	5.8...5.9
1897.51	315.8	0.92	2*n*	See	6.8...7.9
1898.28	316.5	0.99	3*n*	A	5.5...6.0
1905.17	321.7	0.99	3*n*	Doo	

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β^3...β^4...β (2957) (*Pub. L. O.* **II**)... Sp (**II**)...Cin^5...Cin^6...Wilson (Cin^{10})...Lv^1...Lv (*Sid. Mess.* **VIII**, 77)... See (3496).... A (3585).... Tebbutt (*Mon. Not.* **LXIV**, 65).... Doolittle (*Pub. Flower Obsy.* **II**)...]

51 44 **7071.** **H 561.** Examined, 1876, and noted, "Very wide, at least 100″; but angles 160° and 260°. Error of 90° in one angle by H." It has since been measured by Glasenapp (I):

AB	1890.45	162°.3	126″.24	2*n*	8.3...8.7
AC	1890.45	260.8	156.26	2*n*	...9.3

51 48 **7072.** **H 2757.** "Neat." H (VIII) 92°.3: 9...10 (1836.2).

51 53 **7073.** **β 808.** Discovered with the 15½-inch at the Washburn Observatory. C is SD (8°) 3871.

The later measures are:

A and B

1893.49	200°.6	0″.64	1*n*	Wilson	9.0...9.0
1901.66	202.5	0.51	4*n*	Doo	

AB and C

1888.51	305°.6	93″.86	3*n*	Com	8.7...8.4
1893.40	305.6	93.21	3*n*	Wilson	9.0...8.5
1899.26	305.7	93.47	3*n*	β	9.0...9.2
1900.22	305.6	94.00	4*n*	Doo	

[β (**XII**)...β^4...Com (**VI**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

7074. **H 2756.** "Fine." 51m 54s

1873.39	94°.5	27″.70	1*n*	Δ	9.0...10.0

[Δ (I)...*A. G. Leipzig*, p. 249...]

7075. **H 4722.** Probably unchanged. See measures two distant stars. 52 15

1890.40	341°.0	8″.77	2*n*	Gla	6.7...9.1
1903.51	339.1	8.70	2*n*	Scott	7.5...9

[Cin^1...Wilson (Cin^{10})...Glasenapp (I)...See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...]

7076. **H 243.** (= **OΣ 290** *rej.*) Companion not seen by Dembowski in 1866. I found it about 11.5m in 1875. The only measures are: 52 18

1843.31	21°.2	17″.65	1*n*	Ma	
1897.34	25.2	18.37	2*n*	Doo	
1899.49	24.0	18.02	3*n*	Hu	6.8...12.5

[Ma (**XI**)... Δ (I, p. 229)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

7077. 18 *Librae.* **Σ 1894.** (= **H IV. 56** = **Sh 375.**) Without change. The principal star has a proper motion of 0″.143 in 239°.8 (Auwers). Engelhardt measures a distant star, 40°.5: 160″.85 (1894.38) 2*n*. 52 24

1866.98	38°.9	19″.52	3*n*	Δ
1887.42	40.0	20.03	2*n*	Eng
1901.47	39.3	20.02	1*n*	Hu

[Mh...Ma (*F. S.* I)...OΣ (**IX**)...Δ (**II**)...WS...Gl... En (2663)... Engelhardt (**II, III**)...Glasenapp (I)...]

7078. **Σ 1897** *rej.* Nothing but the following since Struve: 52 24

1905.24	323°.6	24″.70	1*n*	β^6	8.0...10.5

7079. **β 1085.** Discovered with the 36-inch. This star has a proper motion of 0″.413 in the direction of 254°.7 (Porter). The short interval covered by the measures is sufficient to show that the new star is moving with the other. If fixed in space, the position of the companion in 1898 would be 34°.4: 11″.87. This is a naked-eye star in *Libra.* 52 37

1898.31	21°.0	9″.44	2*n*	A
1899.27	20.7	9.30	1*n*	β
1902.27	19.7	9.17	3*n*	Doo

[β (**XV**)... β (2929) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... A (3585)... Doolittle (*Pub. Flower Obsy.* **II**)...]

52^m 52^s **7080.** **Σ 1895.** No change.

1866.58	44°0	12″18	4*n*	Δ
1895.39	43.3	12.48	2*n*	Gla

[H (**IV**)...Ma (**XI**)...Ma (*F. S.* **I**)... Δ (**II**)... Glasenapp (**IV**)... Maw (**III**)... *Annals Toulouse Obsy.* **III**...]

53 17 **7082.** **Σ 3089.** "Double" in *Harvard Zones*. Seen by Dembowski in 1865, but not measured. Easy with 6-inch, 1875. No change.

1879.35	34°1	5″39	2*n*	Cin
1903.22	33.2	4.99	2*n*	β

[Ma (*F. S.* **II**)... Δ (1736)...Cin^5...β^6....]

53 24 **7084.** **Σ 1915.** Apparently fixed.

1866.89	323°9	2″67	3*n*	Δ
1879.33	322.9	2.40	1*n*	β

[Ma (*F. S.* **I**)... Δ (**II**)...Cin^5...β^3...]

53 29 **7085.** **H 1264.** H (V) 289°4 : 23″±: 9...12 (1830+).

53 30 **7086.** **Σ 1898.** Unchanged.

1867.14	207°6	2″70	2*n*	Δ
1905.28	209.3	2.46	1*n*	β

[Ma (*F. S.* **I**)...Se... Δ (**II**)...β^6...]

54 2 **7088.** **Σ 1896.** (= **H 1262.**) Unchanged. H mentions a third star *nf*. This is very distant; there is another about half as far at 330° (1876).

1866.84	280°4	4″42	3*n*	Δ
1897.64	280.2	4.43	2*n*	Maw

The distant star measured by Glasenapp:

1895.37	336°2	60″84	1*n*	Gla	...9.3

[Ma (*F. S.* **I**)....Ma (**XI**)....Se...Du... Δ (**II**)...Per...Glasenapp (**IV**)...Maw (**III**)...]

54 30 **7089.** **H 5491.** "*White : blue.*" There is nothing of the kind in this place. Some error in place as in H's numbers preceding this in H (VII).

54 56 **7091.** **H 562.** (= **Σ 1900** *rej.*) In Σ, 7...10; I found it (1876) as in H. In DM 7.5.

1905.23	307°5	24″41	2*n*	β^6	8.2...10.4

55 19 **7094.** **Hn 22.** No motion.

1905.26	1°3	1″97	3*n*	Doo

[β^4... Com (**VI**)...Innes (*Southern Double Stars*, p. 313)...]

7095. **Σ 1899.** Unchanged. The proper motion of A is 0″10 in 180° (Bossert). 55^m 20^s

1868.42	67°6	28″27	4*n*	Δ
1890.37	67.0	27.97	2*n*	Gla

[Ma (*F. S.* **I**)...Mh... Δ (**II**)...Cin^6...Glasenapp (**I**)...]

7096. *2 Serpentis.* **β 348.** Discovered with the 6-inch. 55 40
There has been but little change in either angle or distance. Auwers gives this star a proper motion of 0″010 in the direction of 188°5. The annual change is very small, and, perhaps, somewhat uncertain. There can be little doubt of the physical relation of these stars. There is a 13.5 m star, 215°9 : 32″86 (1899.26) 1*n*.

One of Herschel's wide pairs, H VI. 51, is erroneously called 2 *Serpentis*. It is 1 *Serpentis*, a 4 m star 4^m 17^s *p* and 77″ *s*.

Some of the later measures are:

1876.84	120°4	0″49	6*n*	Sp
1880.81	117.8	0.46	5*n*	β
1885.53	119.7	0.50	2*n*	HΣ
1887.99	119.1	0.50	6*n*	T
1887.60	116.7	0.53	7*n*	Sp
1889.31	119.0	0.76	2*n*	β
1897.49	111.7	0.70	3*n*	A
1902.98	115.2	0.43	2*n*	Bryant
1903.49	117.6	0.49	2*n*	Biesbroeck

[β (**VI**)...β (2062, 2930)...β^1...β^3...β^4...β (*Pub. L. O.* **II**)... Δ (**I**)... Δ (2086)... OΣ (**X**)...Sp (**II**)...Wilson (Cin^{10})...Hl (**I, II**)...T (2899, 2991)...A (3465) ...HΣ (**XII**)...Brown (3645)...Bryant (*Mon. Not.* **LXIII**, 403; **LXIV**, 800)... Biesbroeck...]

7097. **H 2760.** The only measures are in *A. G. Leipzig*, p. 249. 55 48

1895.41	21°3	20″04	1*n*	9.3...9.6

7098. **Σ 1901.** *Bootis* 342. (= **H 563.**) Rectilinear motion. These are all the measures: 55 59

1830+	202°8	20″±	1*n*	H
1831.49	203.7	30.34	2*n*	Σ
1847.30	200.8	29.13	2*n*	Ma
1852.33	202.0	29.25	2*n*	Ma
1865.21	200.8	28.06	6*n*	Δ
1879.29	199.0	27.13	1*n*	β
1881.37	199.7	27.02	1*n*	Pt
1888.52	199.1	26.63	2*n*	HΣ
1897.38	198.5	26.02	3*n*	Doo
1903.28	197.9	25.88	2*n*	Do
1904.26	198.0	25.57	2*n*	β

[Ma (*F. S.* **I**)...H (**II, V**)...Ma (**XIII**)... Δ (**II**)... Δ (1572)...Pt...Flm...β^3... Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3931)...β^6...]

7099. **Sh 191.** (= **H N. 63** = σ 470 = **OΣ (App) 132.**) No measures by H; error of 5′ in declination. No evidence of 56 0 relative motion. The larger star is given a proper motion of 0″.065 in 0° (*A. G. Harvard*).

1876.42	342°.3	40″.32	3*n*	Δ	6.3...7.0
1904.30	342.4	40.20	2*n*	β	

[Δ (I)...Franz (2649)...Espin (3717) (*Mon. Not.* **LXII**, 532)...Lau (*Bul. Ast.* **XXII**, 238)...β^6...]

56^m 3^s **7100.** **Σ 1905.** Probably fixed.

1866.88	159°.3	3″.82	3*n*	Δ
1905.26	161.6	3.25	2*n*	β

[Ma (*F. S.* **I**)...H (**V**)...Se...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...β^6...]

56 16 **7101.** **Σ 1902.** (= **S 664** = **H 244.**) Probably fixed.

1866.33	186°.8	25″.85	3*n*	Δ
1881.42	187.4	26.14	3*n*	β
1895.36	187.3	25.94	2*n*	Gla
1897.36	187.3	26.04	3*n*	Doo

[Δ (**II**)...β^4...Glasenapp (**IV**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

56 26 **7102.** **H 4727.** "Very fine double star." In O. Arg. S. "duplex, Cl. II."

1890.42	215°.7	7″.51	2*n*	Gla	8.3...8.5
1903.48	216.1	7.62	2*n*	Scott	8.3...8.3

[Cin^3...Cin^4...Cin^5...Wilson (Cin^{10})...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n* **VI**, 368) (*Mon. Not.* **LXIV**, 52)...See (3496)...]

56 33 **7103.** **OΣ 291** *rej.* (= **♅ V. 122** = **Sh 189** = **σ 471** = **OΣ (App) 133.**) Fixed.

1886.17	156°.2	35″.17	4*n*	Franz
1898.34	156.2	35.62	3*n*	Hu
1905.33	156.5	35.47	2*n*	β

[H (**V**)...Ma (**XI**)...Ba (**I**)...Δ (**I**)...Franz (3080)...Hu (*Pub. L. O.* **V**)...Espin (*Mon. Not.* **LXIV**, 677)...β^6...]

(See p. 1076)

56 50 **7104.** **Σ 1903** *rej.* This is in the field with 110 *Virginis*, about 4′ *sf.* The only measure is that given from β^6.

57 17 **7105.** **H 1267.** In another observation, 25° ± : 12″ ± : 9...10.

1895.41	8°.9	13″.61	*A. G. Leipzig*, p. 249	9.2...9.6

57 40 **7106.** **S 666.** *Ursae Minoris* 33. Called *Ursae Majoris* in South. B is Rad^1. 3316. Nothing later but the following:

1879.30	36°.4	171″.79	1*n*	β^3	6.5...8.0

(See p. 1076)

57 46 **7107.** **S 665.** Probably fixed. The following are all the subsequent measures:

1879.46	90°.2	25″.98	1*n*	Cin	7.5...8.5
1890.46	91.3	24.72	2*n*	Gla	7.0...7.6
1903.27	91.5	24.72	2*n*	β	7.7...8.2

[Cin^5...Glasenapp (**I**)...β^6...]

7108. **Ho 391.** The principal star has a considerable proper motion, and the companion is moving with it. 57^m 47^s

Bossert	0″.227 in 246°.7	
Paris	0.268 in 259.3	

The later measures are:

1896.40	140°.0	1″.68	2*n*	Ho
1902.89	138.1	2.22	3*n*	β
1903.32	142.7	1.74	3*n*	Doo

The distant star is fixed in space:

1891.39	296°.6	44″.43	1*n*	Ho	...12.5
1902.89	296.8	42.05	3*n*	β	...12.0

[Ho (3233, 3558)...β^6...]

7109. **Σ 1906** *rej.* The only measures are: 57 52

AB	1905.26	214°.4	17″.36	2*n*	β^6	8.5...9.7
AC	1905.26	261.1	70.72	2*n*	β^6	...10.0

7111. **Σ 1904.** (= **♅ N. 37** = **Sh 192.**) Fixed. 58 9

1867.14	346°.4	9″.71	4*n*	Δ
1889.97	346.2	9.83	5*n*	Giacomelli
1897.49	346.6	9.80	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Se...Wr...H (**IV**)...Ra (**XXIII**)...Δ (**I, II**)...Giacomelli (**II**)...Pt...Δ (1188)...Glasenapp (**I, III, V**)...*Annals Toulouse Obsy.* **III**...]

7112. **Hu 744.** With two later measures the mean is: 58 19

1903.91	356°.9	0″.92	3*n*	Hu	8.7...14.0

[Hu (*Bul. L. O.* No. 65)...]

7114. **Hu 745.** With two later measures the mean is: 59 3

1903.91	24°.5	0″.49	3*n*	Hu	7.4...9.3

[Hu (*Bul. L. O.* No. 65)...]

7115. **H 564.** Certainly an error in this place. No bright star here, and nothing larger than the preceding pair, H 2761 (No. 7113). H 564 probably is DM (29°) 2618, which has the same R.A., but is about 20′ *s*; and this is the star measured: 59 4

1901.21	32°.7	41″.26	2*n*	β^5	8.0...11.4

7116. **H 565.** As in the case of the last pair, there appears to be some error in this. There is no DM star in this place. (See p. 1076) 59 9

7117. **β 119.** Discovered with the 6-inch. The measures indicate some motion in angle. The following are all the observations since Dembowski: 59 10

1878.60	311°.1	1″.41	3*n*	Cin
1887.89	308.3	1.58	7*n*	T
1888.45	306.4	1.61	2*n*	Lv
1890.39	304.9	1.78	2*n*	Gla
1892.35	307.1	1.47	3*n*	Lv

1894.48	304°4	1″61	2*n*	Sp
1897.92	304.6	1.69	7*n*	Doo
1897.95	305.2	1.48	2*n*	Sp
1901.46	304.4	1.50	2*n*	Doo
1903.47	301.0	1.46	2*n*	Biesbroeck
1905.27	298.9	1.53	3*n*	Doo

[β (III) . . . β (*Mon. Not.* **XXXIV**, 59) . . . Δ (I) . . . Cin⁵ . . . Lv¹ . . . Lv (*Sid. Mess.* **VIII**, 77) . . . T (2899, 2991) . . . Glasenapp (I) . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . . Sp (**III**) . . . Biesbroeck . . .]

$59^m 48^s$ **7119.** Σ 1907. Probably without change.

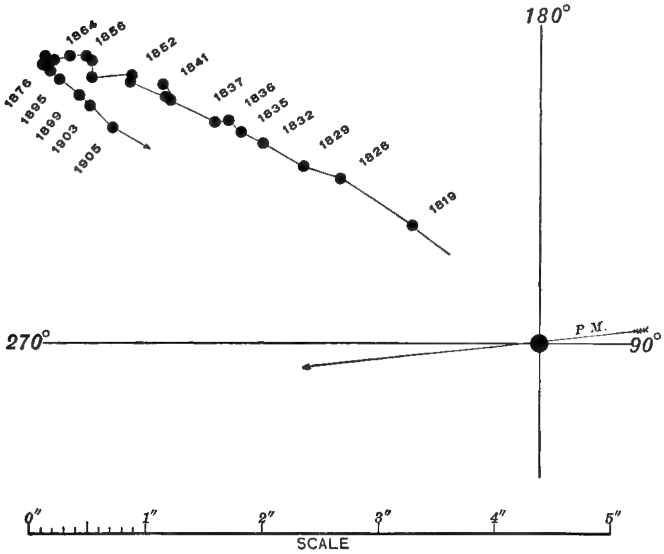
1866.44	6°9	1″07	3*n*	Δ
1898.38	7.5	1.21	2*n*	Gla

[Ma (*F. S.* **I**) . . . . Ma (**X**) . . . . Se . . . . Δ (1125) . . . . Δ (**II**) . . . . Glasenapp (**V**) . . . . Giacomelli (**II**) . . . .]

59 51 **7120.** 44 *Bootis.* Σ 1909. (= H I. 15 = Sh 193.) Binary of long period. The system has a large proper motion:

Auwers	0″433 in 273°0
Porter	0.401 in 276.0

For nearly thirty years there was no material change in the angle and distance of the companion. The distance is now decreasing, and this will continue until the companion passes into the first quadrant. Nothing whatever can be known at this time as to the period, or the form of the apparent orbit, and this will necessarily remain uncertain until the maximum distance has been reached in the opposite quadrant, when the position-angle will be about 60°. I have heretofore shown that the observations prior to Struve are too uncertain in every way to be made of any use in an investigation of the orbit (*Monthly Notices, R. A. S.* LVII, 393).



44 Bootis. Σ1909

On the accompanying diagram measures on 250 nights in 26 positions are shown, covering an interval of 86 years, commencing with the measures of Struve. A mean is given of the measures enclosed in brackets. These observations are as follows:

1819.43	228°0	1″5±	1*n*	Σ
1826.79	231.0	2.23	1*n*	Σ
1829.20	233.6	2.55	2*n*	Σ
1832.95	234.5	2.96	3*n*	Σ
1835.51	235.2	3.17	6*n*	Σ
1836.66	234.9	3.30	4*n*	Σ
1837.75	236.0	3.39	4*n*	Σ
1840.58	235.7	3.86	5*n*	Da
1840.76	238.6	3.86	5*n*	OΣ
1841.94	235.9	3.95	6*n*	Da
1842.40	235.6	3.84	2*n*	Da
1842.78	237.2	3.91	2*n*	Ma
1843.50	237.9	3.92	6*n*	Ma
1848.36	236.3	4.23	3*n*	OΣ
1848.49	237.7	4.21	3*n*	Da
1851.75	237.9	4.15	11*n*	Ma
1852.75	237.9	4.25	15*n*	Ma
1853.76	237.4	4.19	4*n*	Ma
1854.56	239.9	4.38	11*n*	Δ
1855.16	239.1	4.62	2*n*	Δ
1856.81	237.2	4.68	4*n*	OΣ
1856.48	238.8	4.70	5*n*	Δ
1858.41	238.5	4.67	4*n*	Δ
1858.69	236.9	4.68	2*n*	Ma
1861.57	238.3	4.55	4*n*	Ma
1863.44	238.3	4.79	7*n*	OΣ
1865.36	239.5	4.75	12*n*	Δ
1873.00	240.1	4.86	6*n*	Δ
1876.10	239.7	4.85	6*n*	Sp
1876.47	240.5	5.02	2*n*	Hl
1880.14	240.4	4.77	11*n*	Sp
1881.40	241.5	4.93	2*n*	Hl
1882.41	241.0	5.04	4*n*	Hl
1882.50	240.6	4.87	5*n*	Sp
1883.47	241.7	4.91	3*n*	Hl
1883.47	240.6	4.82	5*n*	Sp
1884.44	241.6	4.92	3*n*	Hl
1884.97	240.3	4.87	5*n*	OΣ
1885.38	241.2	5.03	3*n*	Hl
1885.46	240.7	4.79	4*n*	Sp
1886.43	241.9	4.95	3*n*	Hl
1887.57	241.0	4.75	6*n*	Sp
1888.42	240.9	4.90	3*n*	Hl
1889.51	242.5	4.79	3*n*	Hl
1889.61	240.3	4.84	2*n*	Maw
1890.48	241.6	4.84	3*n*	Hl
1891.45	241.5	4.86	3*n*	Hl
1894.33	241.2	4.77	5*n*	Com
1895.39	240.3	4.66	2*n*	Gla
1896.47	243.1	4.82	4*n*	Hu
1898.02	241.8	4.50	7*n*	Coleman
1899.62	242.1	4.50	2*n*	Maw
1900.23	242.1	4.51	2*n*	Doo
1900.62	242.0	4.56	2*n*	Do
1901.52	243.9	4.31	1*n*	Bowyer
1903.30	242.7	4.39	2*n*	Biesbroeck
1903.32	243.6	4.48	2*n*	Do
1903.34	239.5	4.45	1*n*	Lewis
1905.27	243.4	4.16	4*n*	β

The investigations of the orbit are:

1852	Madler	181. yrs.	*Dorpat Obsns.* XIII, p. 76
1875	Doberck	261.12	*A. N.* 2064
1895	Burnham	Indeterminate	*Mon. Not.* LVII, 393

[Ma (*F. S.* **I**) ... Ma (304, 324) ... Ma (**IX, X, XI, XIII, XV**) ... H^1 ... H^2 ... H (**V**) ... Σ^1 ... Mh ... Wr ... Da (*Mem. R. A. S.* **V**, 139) ... Da^1 ... Da^2 ... Da^3 ... Da^4 ... P^1 ... P^2 ... Fl ... J^2 ... WJ^2 ... Bp ... K (1519) ... Se (975) ... Se (*Comp. Rend.* **XLI**, 271) ... Se ... Se^2 ... Se^3 ... Miller (863) ... Miller (*Mon. Not.* **XIII**, 23) ... Bond (*Am. Acad.* **II**, 144) ... Ra (**XXII, XXIX, XXXV**) ... Flm ... Hd ... Bru^2 ... Bl (**V**) ... Pl ... Pk ... Ba (**II, III, IV**) ... Do (2064, 2101, 2198, 2242, 2433, 3023, 3680, 3931) .... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Do (*Observatory* **II**, 210) .... En (1518, 1674, 2663) .... OΣ (**IX, X**) .... Δ (1031, 1111, 1188, 1474, 1886) ... Δ (**I, II**) ... Δ (*Mem. Accad. Sci.*) ... WS ... Gl ... Sk ... Sk^2 ... Sk^3 ... Du ... Sp (2133) ... Sp (**I, II, II** App.) ... Pt ... Kustner (2584) ... Je (2351, 2449, 2772) ... Per ... Per (2529, 2748) ... Seagrave (*Sid. Mess.* **II**, 22) ... Hl (*Wash. Obsns.* 1881–86) ... Hl (*A. J.* 301) ... Hl (**I, II**) ... Perry (*Eng. Mech.* **XXXVIII**, 192) ... T (2898) ... *Haverford Coll. Obsy.* 1892 ... Lv (*A. J.* 278) ... Searle (*A. J.* 299) ... See (*Beob. Berlin*, No. 6, 1892) ... Jones (*A. J.* 312) ... Maw (**I, IV**) ... Glasenapp (**I, III, IV**) ... Big ... Big (*Bul. Ast.* **XII**, 299) .... Collins (*A. J.* 378) .... Com (**X**) .... Ebell (3321) .... Hu (*A. J.* 397) .... Eichelberger (*A. J.* 397) .... Lv (*A. J.* 407) .... β (*Mon. Not.* **LVII**, 393) .... Doolittle (*Pub. Flower Obsy.* I) ... *Annals Toulouse Obsy.* **III** ... Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIV**, 800) ... Espin (*Mon. Not.* **LXII**, 529) ... Boeger (*A. J.* 522) ... Coleman (*Mem. R. A. S.* **LIV**) ... Biesbroeck ... β^6 ... Lohse (*Pub. Potsdam Obsy.*) ...]

0^m $:^s$ **7121.** **H** VI. 53. "Unidentifiable." The distance in H is stated to be more than 1′. The only star found in 1905, likely to be this, was DM (48°) 2257. This is 1^m 26^s *p* and and 6′4 *n* of 44 *Bootis*. This is 8.4 m with a 10.5 m companion, 359°1 : 87″4.

0 6 **7122.** **Σ 1908.** The later measures give a larger angle, but do not indicate any motion, and it is therefore probable that the angle in Struve is too small. WS note a third star, 108°7 : 40″±.

1842.71	142°0	1″70	2*n*	Ma
1852.53	145.0	1.61	3*n*	Ma
1868.20	141.5	1.44	3*n*	Δ
1880.49	138.8	1.43	3*n*	Sp
1887.47	144.7	1.48	3*n*	Hl
1895.39	142.1	1.37	2*n*	Gla
1897.56	144.1	1.28	3*n*	Coleman
1903.32	144.5	1.34	3*n*	Do

[Ma (*F. S.* **I**) ... Ma (**X, XIII**) ... Flm ... WS ... Sp (**II**) ... Δ (**II**) ... Hl (**II**) ... Big (*Bul. Ast.* **XII**, 299) ... Glasenapp (**IV**) ... Brown (3645) ... HΣ (**XII**) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403) ... Do (3931) ... Coleman (*Mem. R. A. S.* **LIV**) ...]

1 27 **7126.** 47 *Bootis*. **β 1086.** Discovered with the 36-inch. It is practically certain from the measures already made that this is a physical system. The bright star has a proper motion of 0″080 in the direction of 277°2 (Auwers), and the companion seems to be moving with it. The following are all the later measures:

1898.49	254°1	6″31	3*n*	β
1903.34	251.2	6.25	1*n*	Lewis

[β (**XV**) ... β (2929) (*Pub. L. O.* **II**) ... Lewis (*Mon. Not.* **LXIV**, 800) ...]

1 46 **7127.** **Σ 1910.** (= **Sh 194.**) The components are certainly fixed. Later observers make the distance larger than Struve, and as there is no evidence of motion, it is probable that his distance is too small.

1823.42	209°2	4″78	4*n*	Sh
1843.78	212.6	4.28	2*n*	Ma
1851.00	210.5	4.22	5*n*	OΣ
1855.22	211.1	4.18	5*n*	Ma
1866.32	211.5	4.10	3*n*	Δ
1871.38	211.1	4.00	4*n*	Du
1875.43	210.8	4.11	4*n*	Sp
1879.50	211.5	4.31	3*n*	Hl
1884.42	212.1	4.29	3*n*	Hl
1885.42	210.4	4.29	3*n*	Per
1895.38	210.5	4.14	2*n*	Gla
1903.26	211.8	4.44	2*n*	Do

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... H^1 ... Mh ... Wr ... Se ... Ra (**XXI**) ... OΣ (**IX**) ... Du ... WS ... WS^2 ... Gl ... Sk^2 ... Lv^1 ... Flm ... Δ (1114) ... Δ (**I, II**) ... Je (2351) ... Per ... Per (2748) ... Sp (**II**) ... T (2898) ... Jones (*A. J.* 312) ... Hl (**I, II**)(*Wash. Obsns.* 1884) ... Hayn (3091) ... Maw (**I**) ... Giacomelli (**II**) ... En (2663) ... Glasenapp (**III**) ... 'Big ... Big (*Bul. Ast.* **XII**, 299) ... Knorre (3300) .... Hu (*A. J.* 397) .... Coleman (*Mem. R. A. S.* **LIII**) .... *Annals Toulouse Obsy.* **III** ... Sk^5 ... Do(3931) ...]

7128. **Σ 1911.** Apparently without change. Seen by Dembowski, but not measured. 1^m 57^s

1903.31	295°2	1″86	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**X**) ... Δ (1736) ... Cin^5 ... β^6 ...]

7129. **H 2764.** Magnitudes in 1877 estimated, 9 ... 10. 2 7

1890.45	148°6	18″53	2*n*	Gla	8.8 ... 10.2

[Glasenapp (**I**) ...]

7131. **Ho 392.** Probably fixed. 2 29

1899.44	173°8	7″51	2*n*	A	7.6 ... 12.2
1903.31	170.9	7.04	3*n*	Doo	

[Ho (3233, 3558) ... A (3639) ...]

7132. **Σ 3090.** No material change. The proper motion is given 0″10 in 180° (*A. G. Nico*). 2 33

1868.61	277°0	1″59	4*n*	Δ
1880.35	276.4	1.60	2*n*	Cin

[Ma (*F. S.* **I**) ... Se ... Δ (**II**) ... Cin^5 ... Cin^6 ... LM ... Glasenapp (**I**) ...]

7133. **A 81.** No other measures. 2 34

[A (3668) (*Bul. L. O.* No. 11) ...]

7135. **Hn 23.** No motion. 2 51

1888.40	359°8	3″28	3*n*	Com

[β^4 ... Com (**VI**) ... Jones (*A. J.* 312) ...]

7136. **β 349.** Discovered with the 6-inch. No sensible change. 2 52

1876.43	39°3	4″17	1*n*	OΣ
1880.46	38.8	3.90	6*n*	Hl
1886.44	36.3	4.04	1*n*	HΣ
1892.39	36.2	3.80	2*n*	Lv
1899.27	39.2	3.62	1*n*	β
1901.41	36.8	3.84	3*n*	Doo

[β (**VI**) ... β (2062) ... Δ (**I**) ... Hl (**I, II**) ... OΣ (**X**) .... HΣ (**XII**) ... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

3^m 3^s **7137.** **β** 809. Discovered with the 15½-inch at the Washburn Observatory. No material change. The magnitude in SD is 8.3.

1888.51	123°5	1″75	3*n*	Com
1892.40	119.2	1.64	2*n*	Lv
1898.47	122.5	1.68	2*n*	Doo
1905.21	122.4	1.52	3*n*	Doo

[β (**XII**) . . . β^{4} . . . Com (**VI**) . . . Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . .]

3 6 **7138.** **Σ** 1912. Fixed.

1866.58	155°4	6″73	3*n*	Δ
1904.34	153.3	7.04	1*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H2 . . . Se . . . Δ (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

3 10 **7139.** **H** 4740. "Excessively close if double." The place in H is exactly the same as that of the star given from O. Arg. S., and I have therefore assumed that that is the star referred to. This was examined with the 6-inch in 1877, and found to be a wide, easy pair, estimated 20°: 3″ · 9 . . . 10, but no close pair seen. Wilson observes for H 4740 a very close pair, 357°9 : 0″2±: 8.5 . . . 9.0 (1884.31) 1*n*; "notched, but not clearly separated." This has not been verified. The only measure of the small pair is:

1898.28	8°3	3″35	4*n*	Doo	9.0 . . . 10.0

[Wilson (Cin^{10}) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

3 21 **7140.** **H** 2766. B. A. C. 4993. The only measure of this is:

1903.32	330°5	56″35	2*n*	β^{6}	6.7 . . . 10.8

3 26 **7141.** **H** 248. C not seen with 6-inch (1877). The only measures are:

AB	1904.42	278°4	13″37	1*n*	β^{6}	9.5 . . . 10.0
AC	1904.42	118.4	47.83	1*n*	β^{6}	. . . 12.0

4 17 **7143.** **H** 566. (= **Σ** 1913 *rej.*) Nothing later but this:

1905.11	285°8	23″77	1*n*	β^{6}	8.0 . . . 10.5

5 11 **7147.** **Hu** 144. Discovered at Mt. Hamilton.

1903.50	241°8	0″71	1*n*	Bowyer

[Hu (*A. J.* 485) . . . Bowyer (*Mon. Not.* **LXIV**, 800) . . .]

5 21 **7149.** **Σ** 1916. (= **S** 668.) Without change. The distance in Cin^{5}, 2″97, is obviously an error.

1865.76	330°0	9″93	3*n*	Δ
1905.11	331.0	9.88	1*n*	β

[Ma (*F. S.* **I**) . . . H1 . . . H (**IV, V**) . . . Δ (**II**) . . . Cin^{5} . . . Glasenapp (**V**) . . . β^{6} . . .]

7150. *ι Librae.* **β** 618. (AB = **H VI. 44** = **Sh** 376.) The duplicity of the Herschel companion was discovered with the 18½-inch. There may be a slow diminution in the angle. All the other measures of both companions are given. According to Auwers the principal star has a proper motion of 0″067 in the direction of 231°3. This does not fully explain the change in B. The distance in the early measures would represent not B, but BC. The distance in Sh is printed 50″63, but Sadler has shown (*Eng. Mech.* XXXVIII, 65) that the micrometer readings were wrongly reduced, and that the distance should be 66″50. The principal star was found to be variable by the Harvard observers. 5^m 23^s

B and C

1879.96	23°4	1″74	2*n*	β	10.0 . . . 10.7
1885.33	19.8	1.40	1*n*	W	10.5 . . . 11.2
1896.46	19.1	1.68	5*n*	A	10 . . . 10
1899.30	17.4	1.70	2*n*	β	
1902.76	18.6	1.85	5*n*	Doo	

A and B

1822.84	111°6	66″50	1*n*	Sh
1878.33	110.5	57.46	3*n*	β
1879.96	110.8	57.26	2*n*	β
1885.33	110.3	57.78	2*n*	W
1896.44	111.0	58.23	2*n*	A
1899.30	111.0	57.48	2*n*	β
1901.16	110.5	57.55	3*n*	Doo

[β (**X**) . . . . β^{1} . . . . β^{3} . . . . Wilson (Cin^{10}) . . . . A (3395) . . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . .]

7151. **Σ** 1914. (= **S** 667.) Without change. The companion is DM (4°) 3827. The 30″ pair observed by H (VIII) for Σ 1914 is a wide pair in the field *sp*. 5 25

1867.03	335°7	30″85	3*n*	Δ
1904.34	334.9	31.13	1*n*	Hu

[Ma (*F. S.* **I**) . . . Ferguson (*Wash. Obsns.* 1863) . . . Δ (**II**) . . . β^{1} . . . Cin^{5} . . . Glasenapp (**I**) . . .]

7153. **Σ** 1918 *rej.* This is O. Arg. N. 15161. The only measures are: 5 34

1905.21	21°0	17″77	2*n*	β^{6}

7154. **Weisse** 28. "Duplex" in W^{1}. Not seen double by me on two occasions in 1876 with the 6-inch, and the 40-inch showed no companion in 1903. 6 3

7158. **Σ** 1920. Fixed. 6 48

1867.78	290°2	18″56	4*n*	Δ
1879.28	290.9	18.91	2*n*	β

[Ma (*F. S.* **I**) . . Ma (**XI**) . . . H (**V**) . . . Δ (**II**) . . . Cin^{5} . . . β^{3} . . .]

7159. **Arg.** 27. Noted, "duplex Cl. III" in O. Arg. N. There is no double here except Σ 1920, which is 10′ *n*. That is also marked "duplex." The note to this star is certainly an error, and probably belongs to the Struve pair. 6 50

6^m 57^s **7160.** **Σ 1917.** Without change.

1869.59	56°8	2″19	4*n*	Δ
1885.41	55.6	2.40	3*n*	Per

[Ma (*F. S.* I)...Δ (II)...Du...Per...Per (2748)...]

7 **7161.** **H. C. Wilson 13.** Discovered by Wilson (Cin^{10}). Place approximate, and not identified in any star catalogue.

7 24 **7162.** **Σ 1919.** (= ♅ N. 62 = Sh 197 = OΣ (App) 134.) There is a slow decrease in the distance, with a large common proper motion, which is given from meridian positions:

A = 0″697 in 296°5 Porter
0.682 in 297.3 *A. G. Berlin*
0.718 in 297.2 Rechenberg
B = 0.652 in 295.6 Porter
0.712 in 293.4 *A. G. Berlin*
0.667 in 294.2 Rechenberg

The small relative change will be seen from the following measures:

1832.21	10°2	24″82	4*n*	Σ
1851.26	9.7	24.82	5*n*	OΣ
1867.93	9.8	24.66	4*n*	Δ
1885.44	9.6	24.55	4*n*	Per
1895.60	9.6	24.41	2*n*	Gla
1905.18	10.0	24.12	2*n*	β

[Ma (**XI, XIII, XV**)...Ma (324)...Ma (*F. S.* **I, II**)...Se...Se^3...OΣ (**IX**)...Ra (**XXIII**)...Δ (1209)...Δ (**I, II**)...Per...Per (2748)...Sp (**II**)...Giacomelli (**II**)...Glasenapp (**I, III, IV**)...Franz (3464)...*Annals Toulouse Obsy.* **III**...β^6...]

7 42 **7164.** **Sh 195.** *Librae* 97. (= ♅ V. 131 = σ 476.) B.A.C. 5014. Probably without change. The following are all the other measures:

1783.26	.....	47″77	1*n*	♅	
1879.39	139°7	47.43	3*n*	Cin^5	6.5...8.2
1903.37	140.2	47.20	2*n*	β^6	6.9...7.7

7 42 **7165.** **♅ V. 125.** (= σ 478 = Sh 196 = OΣ (App) 135.) Unchanged.

1823.43	226°7	32″55	1*n*	Sh	
1864.44	228.2	32.58	3*n*	OΣ	7.5...8.0
1876.43	228.1	32.59	3*n*	Δ	8.0...8.5
1891.56	228.2	32.48	4*n*	Franz	7.5...8.2
1897.49	228.1	32.39	2*n*	Gla	7.3...8.4

[OΣ (**X**)...Δ (**I**)...Franz (3464)...Glasenapp (**V**)...]

7 49 **7166.** **A 691.** With later measures the mean is:

1904.48	226°1	0″11	3*n*	A	7.5...7.7

(Proper motion 1″380 in 249°7).

[A (*Bul. L. O.* No. 61)...]

7 51 **7167.** **Σ 1921.** (= **Sh 198.**) Fixed.

1866.48	283°6	30″29	3*n*	Δ
1897.48	283.2	30.54	2*n*	Gla

[Ra (**XXIII**)....Δ (1209)....Δ (**I, II**)....Glasenapp (**III, V**)....*Annals Toulouse Obsy.* **III**...]

7170. **H 1270.** "Neat." All the measures are given. Change in distance? 8^m 8^s

1873.50	158°3	13″84	1*n*	Δ	8.0...10.0
1880.40	159.1	14.06	1*n*	Big	
1905.11	157.7	14.86	1*n*	β	8.6... 9.7

[Δ(I)...Big...β^6...] (See p. 1077)

7171. **Σ 1923.** (= **S 669.**) Fixed. 8 10

1866.75	13°6	4″78	3*n*	Δ
1904.34	13.0	4.88	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^2...Se...Du...Per...Per (2748)...Δ (**II**)...*A. G Leipzig*, p. 209...]

7172. **Σ 1922** *rej.* Looked for in 1905, and nothing found likely to be the pair observed by Struve. It may be the same as H 1270, which is 1° north (No. 7170). 8 10:

7174. **β 350.** **B. A. C. 5020.** Discovered with the 6-inch. Change is uncertain. In Gould 6.9m. 8 29

1879.46	158°1	1″15	2*n*	Cin
1883.40	160.3	1.34	2*n*	Wilson
1886.49	157.7	1.28	3*n*	Hl
1898.49	155.9	1.24	3*n*	Scott
1905.31	156.6	1.17	4*n*	Doo

[β (**VI**)...β (2062)...Cin^5...Cin^6...Wilson (Cin^{10})...Hl (**I, II**)...Glasenapp (**I**)....Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)....See (3496)....Scott (*Mon. Not.* **LIX,** 427)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

7175. **See 222.** Discovered at the Lowell Observatory. 8 45

1899.38	329°3	13″64	3*n*	Cg	8.8...11.7

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7177. **Ho 60.** Discovered with the 18½-inch. The *sp* of two stars. No motion. 8 50

1893.46	38°8	0″39	3*n*	Ho
1899.49	38.0	0.52	1*n*	A
1902.35	35.7	0.37	4*n*	Doo

[Ho (2778, 3234, 3558)....Greenwich Obsy. (*Mon. Not.* **LX**, 506; **LXI**, 486; **LXII**, 383)...A (3639)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)....]

7178. **See 223.** Cogshall could not find this in 1899. 8 51

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7179. **Σ 1924.** Error of 8′ declination in *Mens. Micr.* Not measured by Dembowski. Without change. 8 56

1844.35	307°2	15″49	2*n*	Ma
1896.46	306.1	15.27	3*n*	Lv
1896.50	304.8	15.31	2*n*	Soulé
1896.59	305.1	15.65	3*n*	Eichelberger

[Ma (**XI**)....H (**V**)....Δ (1736)....Ma (*F. S.* **I**)....Eichelberger (*A. J.* 397)....Lv (*A. J.* 407)...Soulé (*A. J.* 410)...]

9^m 9^s **7180.** **Σ** 1933 *rej.* Nothing but the following since Struve:

1905.20	277°9	24″13	2*n*	β^6	8.7...10.2

9 11 **7181.** **OΣ** 292 *rej.* In the *Poulkowa Catalogue* of 1843 the distance is given 1″5, but this is corrected in 1850 to 1″5. Ma has some measures which seem to belong to some other star if the object observed was really double.

1843.31	334°4	1″6±	1*n*	Ma
1847.35	326.7	....	1*n*	Ma

These positions correspond fairly well to OΣ 296. I could not see any close companion to either star of the wide pair with the 6-inch (1874). The principal star is P XIV. 24. Probably not a close pair. The only measure of the distant star is:

1899.59	155°2	125″91	2*n*	Hu	6.5...8.0

[Se...Ma (**XI, XIII**)...Δ (**I**, p. 229)...Hu (*Pub. L. O.* **V**)...]

9 12 **7182.** **H** 2771. The only later observation is:

1900.45	279°7	37″88	1*n*	Es	8.8...12.5

[Espin (*Mon. Not.* **LXIV**, 678)...]

9 27 **7183.** **Σ** 1928. Unchanged.

1866.88	276°7	6″55	3*n*	Δ
1881.48	277.3	6.70	3*n*	β

[Ma (*F. S.* **I**)...Wr...Δ (**II**)...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ...β^4...T (3185)...]

9 29 **7184.** **Σ** 1927. Unchanged.

1865.76	353°3	16″00	3*n*	Δ
1905.33	353.7	15.93	1*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**, p 19) called Σ 1972...Ra (**XXIII**)...Δ (1188)...Δ (**I, II**) ...*Annals Toulouse Obsy.* **III**...β^6...]

9 44 **7185.** **Σ** 3091. It is doubtful whether any material change has taken place since the first measures. The star is a difficult one at all times, and there are few complete sets of measures. The following are all the observations:

1832.39	227°3	0.5±	4*n*	Σ
1842.44	34.6	....	1*n*	Ma
1843.91	35.9	0.50	2*n*	Ma
1859.56	243	0.5±	1*n*	Se
1863.50	45?	....	1*n*	Δ
1864.18	25	Obl.	1*n*	Δ
1874.51	....	Obl.	1*n*	Δ
1875.40	Single		1*n*	Hl
1877.97	32.7	0.37±	4*n*	Sp
1878.36	45.0	0.25±	1*n*	β
1879.30	42.4	0.4±	2*n*	Cin
1881.50	49.5	0.30	1*n*	β
1890.39	46.8	0.35	2*n*	β
1899.46	40.4	0.25	3*n*	A
1901.53	46.9	0.19	1*n*	A
1904.23	24.9	0.54	1*n*	Biesbroeck

Two faint stars were noted by Hall. These are all the measures:

AB and C

1875.41	249°4	12″73	1*n*	Hl	...14
1905.41	245.0	12.54	1*n*	β	...13

AB and D

1905.41	280°1	27″97	1*n*	β	...12.5

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Δ (1736)...Δ (**II**)...Sp (**II**)...Cin^5...Hl (**I**) ....β^1...β^4...β (3048) (*Pub. L. O.* **II**)....A (3639) (*Bul. L. O.* No. 11).... Biesbroeck...]

7186. **OΣ** 294. Probably without change. 9^m 47^s

1868.59	248°6	3″23	4*n*	Δ
1878.80	249.3	2.78	2*n*	β
1898.36	246.8	3.46	3*n*	Hu
1901.14	247.4	3.52	3*n*	Doo
1903.38	246.6	3.16	2*n*	Do

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...β^1...β^3...Brown (3645)...Hu (*Pub. L. O.* **V**) ...Doolittle (*Pub. Flower Obsy.* **II**)...Do (3931)...]

7187. **OΣ** 293. No material change. The principal star 10 10
has a proper motion of 0″112 in 280°5 (*A. G. Berlin*), and the companion is moving at the same rate.

1868.79	348°0	10″56	4*n*	Δ
1884.38	346.9	11.23	2*n*	Per
1898.44	345.5	11.10	3*n*	Hu

]Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Per...Per (2685)...Hu (*Pub. L. O.* **V**)...]

7189. **β** 351. Discovered with the 6-inch. Apparently 10 20
fixed.

A and B

1884.46	302°9	10″91	3*n*	Hl	9.5...12
1896.49	302.0	10.75	2*n*	Lv	8.5...12
1899.27	303.3	10.53	3*n*	β	8.1...10.7
1901.36	302.4	10.81	3*n*	Doo	8.2...11.3

A and C

1899.26	235°0	33″36	1*n*	β	...12.0
1901.35	234.1	33.63	2*n*	Doo	...12.0

[β (**VI**)...β (2062) (*Pub. Y. O.* **I**)...Hl (**I, II**)...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7191. **Σ** 1926. There is a diminution in the distance, but 10 23
the motion is extremely slow.

1842.69	260°9	1″31	2*n*	Ma
1867.48	255.8	1.42	4*n*	Δ
1872.07	264.9	1.27	4*n*	Du
1877.43	256.2	1.27	4*n*	Sp
1878.72	257.3	1.38	3*n*	β
1884.46	256.4	1.33	3*n*	Hl
1885.41	257.3	1.15	2*n*	Per
1887.58	254.7	1.20	3*n*	Sp
1889.35	257.7	1.10	3*n*	β
1897.50	254.9	0.96	3*n*	A
1898.08	258.6	1.04	8*n*	Coleman
1899.28	258.4	1.20	8*n*	Doo
1903.40	258.7	0.97	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**X**)...Du...Δ (**II**)...Per...Per (2748)...Flm...Sp (**II**, **II** App.)...En (2786)...Hl (*Wash. Obsns.* 1884)...Hl (**II**)...Sk^3...β^1...β^3...β (2957) (*Pub. L. O.* **II**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Glasenapp (**IV**)...A (3465)...Lewis (*Mon Not.* **LIX**, 400; **LX**, 506)...Do (3680)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

$10^m\ 25^s$ **7192.** **OΣ 295.** Change doubtful. The following are all the complete measures:

1843.33	114°8	0″77	2*n*	Ma
1846.38	128.4	0.74	4*n*	OΣ
1846.63	113.1	0.7±	3*n*	Ma
1870.02	122.9	0.92	5*n*	Δ
1876.52	116.9	0.9±	1*n*	Pl
1878.41	128.7	0.75	1*n*	β
1879.45	128.2	0.97	3*n*	Hl
1884.39	128.4	1.01	3*n*	Per
1885.41	130.8	0.96	2*n*	Per
1885.48	127.2	0.89	6*n*	Hl
1886.26	127.6	1.03	8*n*	En
1888.53	130.8	1.02	3*n*	HΣ
1893.47	127.1	1.02	2*n*	Big
1895.39	128.2	0.92	2*n*	Gla
1897.46	134.9	1.24	1*n*	Gla
1898.39	129.1	0.92	3*n*	Hu

[Ma (**XI**, **XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...Hl (*Wash. Obsns.* 1884–1886)...Hl (**I**, **II**)...Per...Per (2685, 2749)...En (2786)...Pl...Sk^3...β^1...Big (*Bul. Ast.* **XII**, 299)...Glasenapp (**IV**, **V**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

10 28 **7193.** **Σ 1925.** Later observers have made the angle a little larger, but change is doubtful. The components have a common proper motion:

Bossert	0″234 in 206°3
Valentiner	0.254 in 206.4

1844.34	7°9	4″50	1*n*	Ma
1848.49	7.3	4.19	1*n*	Mh
1856.28	11.1	4.70	3*n*	Se
1868.40	10.4	4.44	4*n*	Δ
1878.44	10.2	4.91	1*n*	β
1881.97	11.3	4.98	6*n*	Hl
1898.13	9.7	5.09	5*n*	Doo
1905.26	10.9	5.13	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VIII**)...Mh...Flm...Se...Pt...Lv^1...Sk^3...Hl (*Wash. Obsns.* 1884)...Hl (**I**, **II**)...Cin^4...Cin^5...β^1...Glasenapp (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)....]

10 40 **7194.** δ *Bootis.* **Σ 27, App. I.** (= **H** **VI.** 16 = σ 479 = **Sh** 199 = **OΣ** (**App**) 136.) No change since Struve, but a common proper motion:

Auwers	0″137 in 144°3
Bossert	0.140 in 141.6

1857.60	78°7	104″86	3*n*	OΣ
1868.84	78.8	105.14	4*n*	Δ
1879.39	78.6	104.79	4*n*	β
1905.37	78.4	104.81	3*n*	β

[P^1...P^2...Se^1...Ra (**XXV**)...Pk...Δ (**II**)...Engelhardt (**II**)...Schur (2255)...Je (2340)...β^3...Franz (3080)...OΣ (**X**)...Glasenapp (**III**, **V**)...β^6...]

7195. **β 352.** Discovered with the 6-inch. Apparently fixed. $10^m\ 42^s$

1880.36	65°1	14″37	3*n*	Cin	7.8...9.0
1890.42	68.1	13.17	2*n*	Gla	8.2...9.6
1892.41	68.3	13.95	2*n*	Lv	8.1...9.2
1901.60	65.9	13.82	4*n*	Doo	8.0...9.2

[β (**VI**)....β (2062)....Cin^5....Cin^6....Glasenapp (**I**)....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7196. **Ho 547.** No change. 10 54

1902.35	301°2	5″23	4*n*	Doo

[Ho (3557)...]

7197. **See 226.** A later position is: 11 20

1900.48	71°8	21″29	1*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7198. **See 227.** Very small stars. The magnitude in Cord. DM is 9.7. 11 20

1900.45	120°2	7″62	3*n*	Cg	10.5...13

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7199. **H 2772.** "Both ruddy." 11 32

1903.31	316°1	8″96	2*n*	β^6	9.0...11.7

7200. **Σ 1929.** Fixed. 11 51

1868.22	7°0	6″18	4*n*	Δ
1879.35	8.1	5.96	1*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**, **XIII**)..Δ (**II**)...Cin^5...]

7201. **β 227.** Discovered with the 6-inch. In the field with β 228. Some of the later measures are: 12 7

1878.44	179°9	1″95	4*n*	Cin	7.2...9.2
1890.40	179.7	2.31	2*n*	Gla	7.7...8.6
1896.44	176.8	1.89	2*n*	Scott	
1898.05	177.8	1.97	8*n*	Doo	7.1...8.4
1903.26	174.8	2.25	3*n*	Doo	7.2...9.7

The proper motion of the principal star is 0″091 in 244°1 (Battermann).

[β (**IV**)...β (*Mon. Not.* **XXXIV**, 382)...Cin^3...Cin^5...Cin^6...LM...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon. Not.* **LIV**, 52)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I**, **II**)...]

7202. **OΣ (App) 137.** P XV, 39. The proper motion of the large star is given from meridian observations: 12 11

Battermann	0″055 in 158°9
A. G. Harvard	0.079 in 165.7

This value is too small, or the companion has a motion of its own. The measures of Δ, Franz, and β give for the movement of A, 0″103 in 149°5.

1883.36	106°5	75″14	5*n*	Franz
1903.32	105.5	73.72	3*n*	β

[Δ (I) ... Franz (2649) ... Espin (*Mon. Not.* **LXII**, 532) ... β^{6} ...]

12^{m} 16^{s} **7203.** **β 943.** Discovered with the 18½-inch. Near 6 *Serpentis*. The later measures are:

1889.30	92°7	2″63	3*n*	β
1899.27	94.1	3.01	1*n*	β
1901.36	92.4	2.73	3*n*	Doo

[β (**XIII**) ... β^{3} ... β (2930) ... β (*Pub. L. O* **II**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

12 24 **7204.** **A 16.** Later measures are:

AB	1901.53	169°7	0″33	1*n*	A	9.0 ... 9.5
AC	1901.53	83.2	2.38	1*n*	A	... 14.5

[A (3635) (*Pub. A. S. P.* **XI**, 161) (*Bul. L. O.* No. 11) ...]

12 37 **7207.** **H 4758.** (= **Ho 548.**) The only measures are:

1896.46	79°0	5″53	2*n*	Ho	8.5 ... 8.6
1903.33	79.4	5.66	3*n*	Doo	

Doolittle measures a pair of small stars, 2^{m} 35^{s} *p* and 7′ *n*.

1903.32	211°3	5″31	4*n*	Doo	9.0 ... 9.8

[Ho (3557) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

12 38 **7208.** **β 228.** Discovered with the 6-inch in looking for H 4756, which is given by Herschel (*Cape Observations*), 180° ± : ⅔″: 9 ... 9½, with the note, "requires verification." His place is substantially the same as that given here, but the magnitude is very different from that of B. A. C. 5041, which is at least 7½, and his estimated angle and distance do not correspond with the star measured. The components have a proper motion of 0″091 in 228°8 (Battermann). β 227 is in the field *p*. The following are all the later measures:

1884.41	329°4	1″14	1*n*	W	9.0 ... 9.3
1886.30	328.4	....	1*n*	LM	7 ... 8
1892.40	327.6	0.98	2*n*	Lv	7.2 ... 8.1
1899.08	321.2	0.91	3*n*	Doo	8.2 ... 8.7
1903.26	321.8	1.05	4*n*	Doo	

[β (**IV**) ... β (*Mon. Not.* **XXXIV**, 382) ... Cin^{3} ... Cin^{4} ... Wilson (Cin^{10}) ... LM ... (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**) ...]

12 57 **7210.** **Σ 1931.** (= **Sh 200.**) Fixed.

1866.00	171°7	13″19	3*n*	Δ
1890.32	170.5	13.22	5*n*	Giacomelli
1904.34	170.6	13.40	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**VII**) ... Se ... Da^{3} ... Ra (**XXIII**) ... OΣ (**IX**) ... Δ (1188) ... Δ (**I, II**) ... WS ... Hunt (*Observatory* **III**, 605) ... Giacomelli (**II**) ... Per ... Per (2748) .... Glasenapp (**IV**) ... *A. G. Leipzig*, p. 209 .... *Annals Toulouse Obsy.* **III** ...]

7211. **Lv 6.** Discovered by Lv. Approximate place. 13^{m} :^{s}

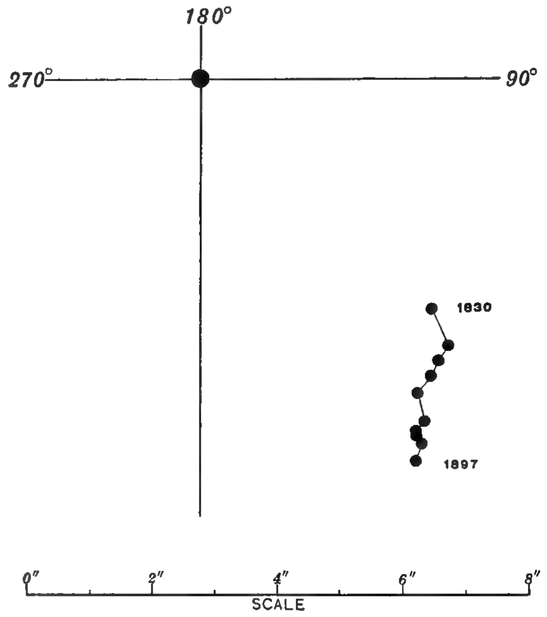
1904.48	31°8	15″93	3*n*	Miller	8.0 ... 10.2

Miller identifies this as Cord. G. C. 20778. The place is:

R. A. = 15^{h} 13^{m} 26^{s} }
Decl. = −26° 35′ 10″ }

[Lv (*A. J.* 278) ... Lv (*Proc. Haverford Coll. Obsy.* 1892) ...]

7212. **Σ 1934.** Decided change in angle and distance, and apparently rectilinear motion. 13 10



Σ 1934

1830.88	45°1	5″30	3*n*	Σ
1843.59	42.8	5.94	2*n*	Ma
1852.68	40.0	6.00	8*n*	Ma
1865.39	37.8	6.11	6*n*	Δ
1872.06	34.5	6.18	5*n*	Du
1882.45	33.2	6.62	7*n*	Hl
1885.96	31.4	6.73	2*n*	Per
1890.66	31.2	6.75	3*n*	HΣ
1895.54	31.4	6.86	2*n*	Collins
1897.88	29.6	7.10	5*n*	Doo

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... H^{2} ... Se ... OΣ (**IX, X**) ... Flm ... Du ... WS .... WS^{2} .... Sk .... Seagrave (*Sid. Mess.* **II**, 22) .... Do (2198, 2307) .... Δ (1572) ... Δ (**II**) ... Hl (*Wash. Obsns.* 1882, 1884) ... Hl (**I, II**) ... T (2898) ... Big ... Maw (**I**) ... Collins (*A. J.* 378) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ... Boeger (*A. J.* 522) ... Thiele (3837) ... Sk^{5} ... Coleman (*Mem. R. A. S.* **LIV**) ... Biesbroeck ...]

7213. 5 *Serpentis*. **Σ 1930.** (= **H III. 106** = **S 670.**) 13 10
There is very little relative change, but the components have a large common proper motion:

Auwers	0″638 in 146°0
Bossert	0.649 in 146.3
Boss	0.645 in 147.1

In 1836 Struve suspected an elongation of the principal star in 342°5; and Madler measured it, 343°6 : 0″2± (1844.35) 1*n*. No signs of duplicity have been detected by any of the large refractors with which it has been examined since that time, and there is little doubt now that the suspected elongation was an illusion.

1848.38	39°2	10″52	2*n*	OΣ
1858.52	37.1	10.59	2*n*	Se
1865.93	40.4	10.35	3*n*	Δ
1879.51	40.0	10.71	3*n*	Hl
1883.67	39.6	10.90	7*n*	En
1885.23	40.0	10.86	5*n*	Hl
1903.35	39.1	10.90	2*n*	Do
1903.51	38.6	10.66	3*n*	β

OΣ measures a distant 9 m star for determining the proper motion of A:

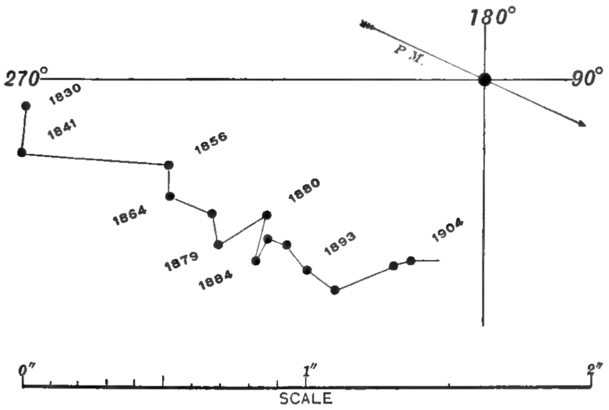
1852.34	Δ R. A. 43ˢ67	Δ Decl. 53″27	1*n*	OΣ
1884.36	44.43	38.26	2*n*	HΣ
1903.48	45.05	29.34	2*n*	β

Direct measures are:

1887.41	51°0	124″57	1*n*	Eng

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... OΣ (**IX, X**) ... Δ (**II**) ... Sk³... Pk ... Safford (*Mon. Not.* **XXXVIII**, 527) .... Sadler (*Ast. Reg.* **XXIII**, 117) .... Hl (*Wash. Obsns.* 1863, 1875, 1884, 1886) .... Hl (**I, II**) .... Sp (**II**) .... Per.... Per (2529)... T (2866) ... Engelhardt (**II**)... En (2663)... Lehman (*Pub. A. S. P.* **IX**, 141)... Do (3931)...β⁶...]

$13^m 12^s$ **7214.** **Σ 1932.** *Coronae* 1. The character of the motion is not certain from the measures, but the probabilities are that it will prove to be a physical pair.



Σ 1932

Some observers have reversed the angle, or made the stars equal, and variability of one has been suggested. The explanation may be that the difference in magnitudes given by Σ is too large. The system has a proper motion of 0″191 in 65°2 (Bossert).

Some of the observed positions at short intervals are:

1830.28	273°8	1″62	3*n*	Σ
1841.46	279.3	1.65	2*n*	OΣ
1856.40	285.4	1.15	2*n*	Se
1864.14	290.6	1.18	6*n*	Δ
1873.38	296.4	1.07	2*n*	Δ
1879.52	302°2	1″10	3*n*	Hl
1880.46	302.3	0.90	7*n*	Je
1884.45	308.8	1.03	3*n*	Hl
1885.48	306.4	0.95	3*n*	Per
1886.43	310.4	0.91	3*n*	Hl
1893.50	317.3	0.92	2*n*	Lewis
1898.17	324.9	0.91	3*n*	A
1903.34	334.2	0.73	2*n*	Do
1904.45	338.0	0.69	4*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... H¹... H²... Da²... Da³... Se... Hd... Flm...Du...WS...WS²...Gl...Sk...Sk³... Kn... Bru²... Do (2198, 3023, 3680, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Pl....Perry (*Eng. Mech.* **XXXVIII**, 192)... OΣ (**IX, X**)... Δ (1114, 1188, 1474)... Δ (**I, II**)... En (1518, 1674, 2677)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (*A. J.* 301)...Hl (**I, II**)... Sp (2133)....Sp (**II**).... Per.... Per (2529, 2748).... Je (2449, 2772, 3802).... T (2866)... β³... Maw (I, **III, IV**)... Greenwich Obsy. (*Mon. Not*, **LIV**, 317; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)....Callandreau (*Bul. Ast.* **XII**, 523)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (**X**)...Knorre (3300)... Schwarzchild (3335)... Lv (*A. J.* 382)... Glasenapp (**IV, V**) .... Brown (3645) .... Coleman (*Mem. R. A. S.* **LIII**) .... A (3585).... Doolittle (*Pub. Flower Obsy.* **I, II**)....*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Biesbroeck...]

7217. **Ho 61.** Fixed. $13^m 25^s$

1896.46	254°2	2″00	2*n*	Ho
1904.00	252.2	1.82	3*n*	Doo

[Ho (2778, 3234, 3558)...]

7218. **β 353.** Discovered with the 6-inch. One of a wide pair. The other measures are: 13 55

1892.42	295°5	3″62	1*n*	Lv
1892.42	295.7	3.74	1*n*	Collins
1901.16	294.9	3.31	4*n*	Doo

[β (**VI**) ... β (2062) ... β⁴... Lv and Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Doolittle (*Pub. Flower Obsy.* **II**)...]

7219. o¹ *Librae.* Distant companion noted in trying to identify 𝕳 V. 132. There is nothing in the place given by 𝕳. It is probably identical with this star. (See No. 7225.) The proper motion of o¹ *Librae* is 0″039 in 14°9 (Auwers). 14 19

7220. **𝕳 V. 27.** "Identification extremely doubtful." There is no such pair in this place. There is no doubt of its identity with Sh 202. (See No. 7268). 14 42:

7221. **See 230.** Later measures are: 14 44

1899.38	148°8	3″41	3*n*	Cg	9...10

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7222. 6 *Serpentis.* **β 32.** Discovered with the 6-inch. Relative change is not entirely certain, but it is a physical system, as the components have a common proper motion. The principal star has an annual movement of 0″126 in the direction of 219°0 (Auwers). 14 55

Some of the other measures are:

1875.40	14°8	3″11	1*n*	Hl
1876.43	9.3	2.81	1*n*	OΣ
1879.40	13.6	2.37	2*n*	β
1887.34	15.6	2.39	2*n*	T
1888.52	16.2	2.68	2*n*	T
1889.30	17.9	2.44	3*n*	β
1897.48	11.6	2.38	3*n*	A
1898.20	14.5	2.63	3*n*	Doo

[β (I)...β (*Mon. Not.* **XXXIII**, 351) ... β^3... β (2930) (*Pub. L. O.* **II**)... Δ (I)... Δ (2081) ... Hl (I) ... T (2866, 2899, 2991) ... OΣ (X) ... Lv^1... A (3465) ... Doolittle (*Pub. Flower Obsy.* I)...HΣ (XII)...]

15^m 7^s **7223.** **Lalande 27966.** Noted in attempting to identify H̥ V. 132. (See No. 7225.)

[β^6...]

15 18: **7225.** **H̥ V. 132.** There is nothing in this place. It is either No. 7219 or No. 7223.

15 18 **7226.** **Σ 1935.** Without change.

1865.99	288°7	8″34	3*n*	Δ
1905.12	289.8	8.32	1*n*	β

[Ma (XIII)...Ma (*F. S.* I)...Δ (II)...Glasenapp (V)...β^6...]

15 32 **7227.** **Σ 3092.** Probably without change.

1868.67	165°8	14″03	4*n*	Δ
1879.30	164.2	14.21	1*n*	Cin
1890.40	164.5	15.30	1*n*	Gla

[Ma (*F. S.* I)...Δ (II)...Cin^5...Glasenapp (I)...]

(See p. 1077)

15 37 **7228.** **See 232.** This was discovered by Cogshall. His later measures disagree in distance and magnitudes:

1900.44	44°6	5″03	2*n*	Cg	9.0...12.7

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

15 39 **7231.** **Hu 146.** The later measures are:

1902.12	174°2	0″39	3*n*	Lewis

[Hu (*A. J.* 485)...Lewis (*Mon. Not.* **LXII**, 383; **LXIV**, 800)..]

16 2 **7233.** **Σ 1936.** Without change. R. A. and Decl. too large in *Mens. Micr.*; identified as here given.

1869.38	231°9	20″03	3*n*	Δ
1901.26	231.7	20.33	2*n*	β

[Ma (*F. S.* II)...Δ (II)...β^5...]

16 5 **7234.** **Hn 24.** No change.

1888.40	274°3	3″84	3*n*	Com

[β^4...Com (VI)...]

7235. **Ho 62.** Without change. 16^m 5^s

1897.10	280°5	0″93	3*n*	Ho
1902.40	280.6	1.18	4*n*	Doo

[Ho (2778, 3234, 3558) ... Greenwich Obsy. (*Mon. Not.* **LX**, 506; **LXI**, 486; **LXII**, 383)...]

7236. **Ho 264.** Apparently fixed. 16 23

1891.94	326°9	0″98	2*n*	Ho	7.7...11.5
1903.34	322.7	1.12	4*n*	Doo	

[Ho (2977, 3234, 3558)...]

7237. **Σ 3093.** There is considerable change in the distance of the small star; rectilinear motion. The following are all the measures: 16 27

1829.36	135°5	33″38	2*n*	Σ
1847.32	137.4	32.57	2*n*	Ma
1865.58	138.6	31.15	5*n*	Δ
1878.35	139.9	30.79	1*n*	β
1879.32	138.8	30.64	5*n*	Cin
1885.44	141.6	28.40	2*n*	Sk
1890.41	140.1	29.41	2*n*	Gla
1898.21	140.6	29.02	3*n*	Doo
1905.22	142.1	28.60	1*n*	β

The principal star was suspected to be double, 240°:1″, at Cincinnati in 1879. Not seen since, and probably not a close pair.

[Ma (*F. S.* II)...Δ (1572)...Δ (II)...β^1...Sk^3...Cin^5...Glasenapp (I)...Flm ...Doolittle (*Pub. Flower Obsy.* I)...β^6...]

7239. **See 233.** Later measures at the Lowell Observatory are: 16 51

1900.46	224°6	14″00	3*n*	Cg	7.5...14

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7241. **12** *Ursae Minoris.* **H̥ V. 86.** (= σ **484.**) The only observations since 1783 are the following: 17 9

AB	1905.18	132°8	55″87	1*n*	β^6	8.0...10.3
AC	1905.18	113.7	89.50	1*n*	β^6	...10.0

7242. **Comstock.** From *Pub. Washburn Obsy.* VI. No other measures. 17 18

7244. **H 2779.** (= **OΣ 542.**) "Fine." Probably fixed. 17 28

1864.17	348°9	11″23	2*n*	OΣ	7.2... 9.8
1873.40	351.4	10.59	1*n*	Δ	7.0...11.0
1898.44	347.5	11.31	3*n*	Hu	

[OΣ (IX)...Δ (I)...Hu (*Pub. L. O.* V)...]

7245. **OΣ (App) 138.** Relatively fixed. 17 34

AB	1905.33	198°4	150″71	1*n*	β
AC	1905.33	164.8	81.31	1*n*	β

[Δ (I)...Franz (2649)...β^6...]

17ᵐ 59ˢ **7246.** **H** 4767. "*Red: blue.*" Only reddish (1875).

1880.39	142°2	32″62	2*n*	Cin⁶	8.0... 9.8
1904.86	143.2	32.57	2*n*	β⁶	8.0...10.5

18 : **7247.** **Egbert** 4. Place approximate; from Cin⁶. As H 4767 is also given, they are probably distinct objects. In measuring H 4767, I could not find this in the immediate vicinity.

18 2 **7248.** **A** 17. No other measures.

[A (3635) (*Pub. A. S. P.* **XI**, 161)...]

18 7 **7249.** **H** 1271. (= **H** 4768.) H 4768 is given in H as 1° farther south, but there is nothing in that place, and the two are certainly identical. The descriptions correspond. (See next pair.)

1903.24	106°0	8″58	2*n*	β	9.5...9.5

[β (*Mon. Not.* **XXXIV**, 375)...β⁶...]

18 8 **7250.** **H** 4768. There is nothing in this place. Certainly an error of 1° declination, making it identical with H 1271. (See No. 7249.)

[β (*Mon. Not.* **XXXIV**, 375)...β⁶...]

18 15 **7251.** *η Coronae Borealis.* **Σ** 1937. (= **H** I. 16 = **Sh** 201.) One of the best known and most interesting of the older binary systems. It is never at any time a very close pair, and the measures are numerous and well distributed. The system has a proper motion which is given from meridian observations:

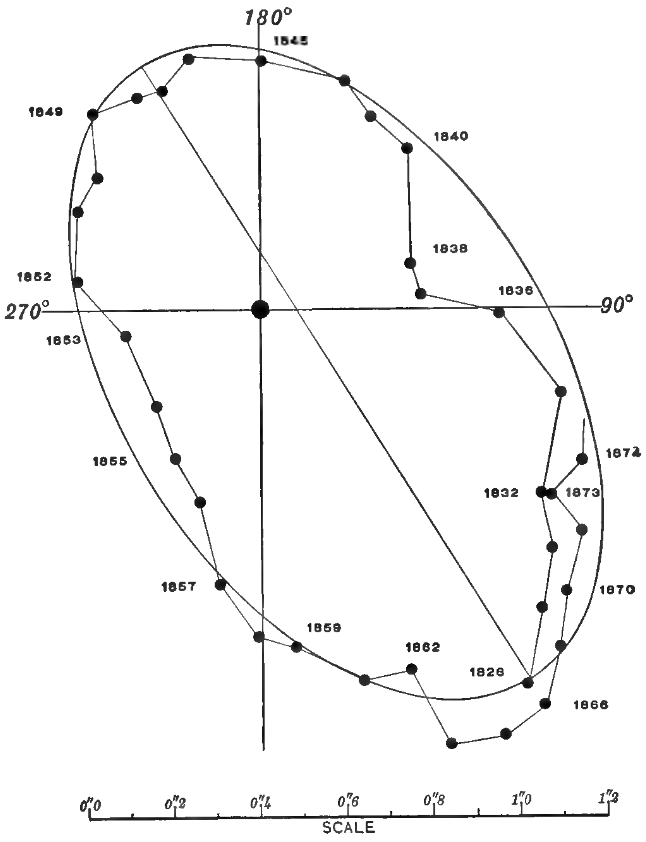
Auwers	0″219 in 150°7
Porter	0.217 in 148.5

The measures by the Struves cover more than one revolution. These 37 annual mean results derived from measures on 150 nights, are given on the diagram, Fig. 1:

1826 to 1838	Σ	8	33*n*
1840 to 1874	OΣ	29	117*n*

The following orbits have been found from measures to the respective dates in the first column:

1833	Herschel	44.24 yrs.	*Mem. R. A. S.* VI, 156
1841	Madler	43.34	*A. N.* 354
1842	Madler	43.25	*Dorp. Obsns.* IX, 194
1846	Madler	42.50	*Fixtern-System* I, 242
1847	Villarceau	66.26	*A. N.* 678
1847	Villarceau	42.50	*A. N.* 678
1852	Villarceau	67.31	*A. N.* 868
1856	Winnecke	43.11	*A. N.* 967
1867	Reuss	43.	*Bul. Asso. Sci. de France*
1870	Wijkander	41.58	*A. N.* 1868
1875	Wilson	41.2	*Mon. Not.* XXXV, 363
1877	Flammarion	40.17	*Étoilés doubles et Mult.*
1880	Doberck	41.56	*A. N.* 2338
1887	Grossman	41.70	"*η Coronae*," Gottinger, 1892
1892	Comstock	41.6	*Proc. Am. Asso.* 1894 (Address)
1895	See	41.60	*A. N.* 3361
1895	Doberck	41.56	*A. N.* 3370
1895	Doberck	41.51	



η Coronae. Σ 1937. *Fig. 1*

The period should be fairly well determined, but a substantial improvement can be made in all the elements of the orbit by discarding a greater part of the measures, and using only the best in the computation.

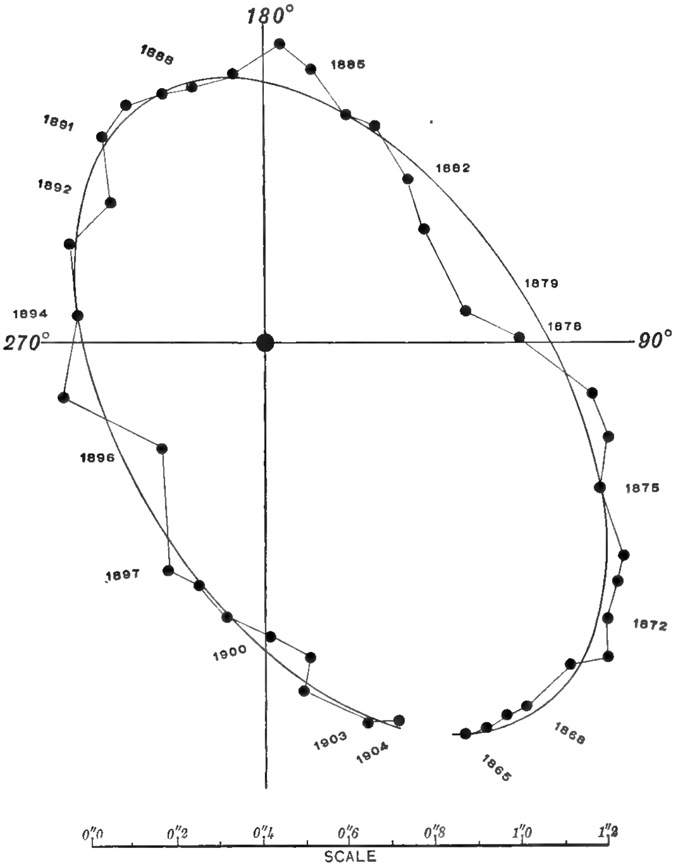
By way of comparing the older measures with those of later observers, the second revolution of the companion is shown on the diagram, Fig. 2, from 38 annual positions, representing measures on 237 nights.

1865 to 1878	Δ	13	107*n*
1879 to 1891	Hl	12	53*n*
1892 to 1904		13	77*n*

The last thirteen positions are derived from measures by HΣ, Sp, Hu, A, Doo, Com, Maw, Bryant, and Biesbroeck on 77 nights. The same ellipse, which is drawn to represent the observations of 1865 to 1904, is also shown on Fig. 1.

There is a faint star in the field, first noted by H (VI), the distance of which is increasing from the proper motion of AB.

1836.49	97°0	15″79	1*n*	Lamont
1856.30	26.3	48.58	2*n*	Wn
1898.48	16.0	54.14	1*n*	β



η Coronae. Σ 1937. *Fig.2*

[Ma (*Schumacher's Jahrbuch*, 1839)....Ma (**IX, XI, XIII, XV**)....Ma (*F. S.* **I**)...Ma (324, 354, 430, 452, 490)...Σ¹...Ek (**I**)...Mu...Mh...Mh (*Sid. Mess.* Sept. 1846)...H (**V, VI**)...H¹...H²...Bond (*Am. Acad.* **II**, 144)...Lamont (316)....OΣ (411)....OΣ (**IX, X**)....Villarceau (678, 868)(*A. J.* 59)(*St. Pet. Bul.* 1850)(*Comp. Rend.* **XXVIII**, 411; **XXXVI**, 724)(*Mon. Not*, **XIII**, 229)(*Melanges Math. et Astron.* **I**)(*Conn des Temps.* 1852)....Wn (**V**)....Wn (967, 1738)...Wn (*De Stella η Coronae*, etc., Inaug. Dis.)...Fl...Da (*Mem. R. A. S.* **V**, 139)...Da¹...Da²...Da³...Da⁴...Se...Se²...Se³...Se (*Comp. Rend.* **XLI**, 271; **XLVIII**, 375)...K (1519)...Du...Du (1868)...Wijkander (1868)(Du, p. 210)...WJ²...Hd...En (1518, 1674, 2677, 2742, 2786)...Ba (**I, II, III, IV**)...Flm...Flm (*Comp. Rend.* **LXXVIII**, 637)(*Études et Lectures sur l'Astronomie*, Vol. **VI**)(*Mon. Not.* **XXXIV**, 426)...Flm (1998)...Bl (**V**)...Bru²...Pl...Pt...Ferr...Kn...WS...WS²...Gl...Sk...Sk²...Sk³...Sk⁴....Sk⁵....Reuss (*Bul. hebdomadaire de l'Asso. Sci. de France*, 1867, **II**, 246)...Wilson (*Mon. Not.* **XXXV**, 363)...Perry (*Eng. Mech.* **XXXIX**, 415)...Amici (2155)...Kustner (2584)...Δ (1188, 1474, 1572, 1735, 1798, 1886, 1979, 2080, 2193)...Δ (**I, II**)...Sp (2133)...Sp (**I, II, II** App)...Je (2449, 2772)...T (2866, 2898)....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Do (2198, 2242, 2338, 2433, 3023, 3370, 3680, 3931)...Per...Per (2559, 2684)...Hl (*Wash. Obsns.* 1880–86)...Hl (**I, II**)...β¹...β³...β⁴...β⁶...Lv (*A. J.* 278, 382, 407)...Jones (*A. J.* 312)...Ho (2978, 3234, 3558)...*Proc. Haverford Coll. Obsy.* 1892...See (*Beob. Berlin*, No. 6, 1892)....Glasenapp (**I, IV**)....Maw (**I, II, IV**)....Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)....Grossman (*Untersuchung Systematische, etc., η Coronae*, Gottinger, 1892) orbit...Sp (**III**)...Big...Big (*Bul. Ast.* **XII**, 299)....Everett (*Mon. Not.* **LVI**, 464)....Com (**X**)....Knorre (3300, 3518)....Brown (3645)...Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)...*Annals Roy. Obsy. Edinburgh* **I**, p. 188...Biesbroeck...Salet (*Bul. Ast.* **XXII**, 108)...See (3361)(*A. J.* 349, 378)(*Evolution of the Stellar Systems*)....Lau (*Bul. Ast.* **XXII**, 238)....Hu (*A. J.* 397, 427)....A (3639)(*A. J.* 429)(*Bul. L. O.* No. 11)....Doolittle (*A. J.* 416, 547)(*Pub. Flower Obsy.* **I, II**)....Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1077)

7252. **H 4769.** Probably fixed. 18m 24s

1880.37	192°4	9″48	2*n*	Cin	8.2...9.5
1890.42	192.2	8.97	2*n*	Gla	7.7...9.6
1897.42	192.1	9.55	3*n*	Doo	8.0...9.0

[Hd...Cin⁵...Cin⁶...Glasenapp (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

7254. **H 252.** The measures are: 19 17

AB	1880.41	96°7	11″72	1*n*	Big	8.5... 9.5
	1904.36	97.5	11.46	2*n*	β⁶	9.0... 9.3
AC	1904.36	84.0	44.82	2*n*	β⁶	...10.2

7258. *μ Bootis.* **Σ 28 App. I.** (= **H VI. 17** = σ 486 = **Sh 204** = **OΣ (App) 139.**) There has been no change in the angle or distance of these stars. B is a close pair (see Σ 1938), and the three components form one vast system. The common proper motion is: 19 58

Auwers	0″189 in 296°4
Bossert	0.158 in 296.2

A and BC

1866.98	171°8	108″32	7*n*	Δ
1881.45	172.4	108.31	2*n*	Hl
1895.55	171.6	108.27	2*n*	Com
1903.41	171.8	108.26	4*n*	Biesbroeck

Other measures will be found in the observations of Σ 1938.

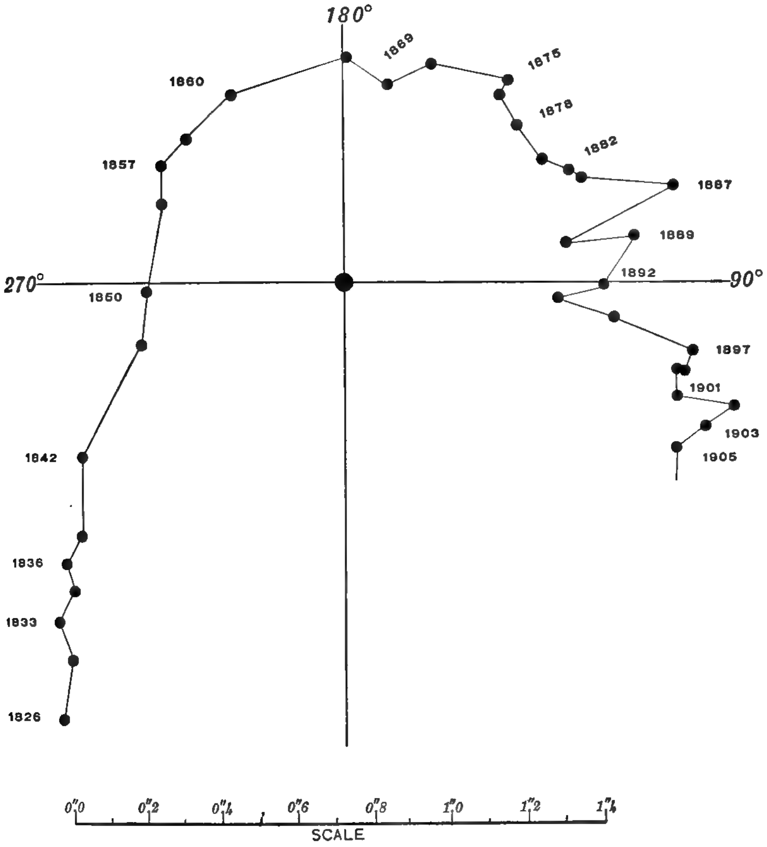
[Se¹...P¹...Ra (**XXVI**)...Kn...Flm...Pk...Bl (**V**)...Schur (2255)...Δ (**II**)...Per...Per (2559)...Δ (1474)...Je (2340)...Hl (**I, II**)...Franz (3080)...Com (**X**)...Do (3931)...Biesbroeck...]

7259. *μ² Bootis.* **Σ 1938.** (= **H I. 17** = **Sh 203.**) This is the companion star of the wide pair, *μ Bootis* (No. 7258), and has the same proper motion as the large star 108″ distant. The close pair is a binary of long period. Nothing whatever is known of any element of the orbit, and nothing can be known for at least another half century. While the companion has described an arc of 260° since the measures of Struve, the remaining part of the ellipse in the first and fourth quadrants is wholly uncertain, and necessarily will be until the position-angle is about 0°. It is not surprising, therefore, that the periods found for this system differ among themselves by several hundred years. 20 0

The following observations are shown on the diagram, a mean being given of those in brackets made in the same year:

1826.77	327°0	1″38	2*n*	Σ
1829.73	324.0	1.24	2*n*	Σ
1833.85	319.7	1.19	3*n*	Σ
1835.55	318.6	1.10	3*n*	Σ
1836.65	315.1	1.06	3*n*	Σ
1840.46	313.8	0.98	3*n*	OΣ

1842.23	303°.5	0″.85	3*n*	OΣ
1846.68	287.1	0.57	4*n*	OΣ
1850.46	272.7	0.53	2*n*	OΣ
1855.11	247.2	0.53	4*n*	OΣ
1857.65	237.9	0.58	3*n*	OΣ
1858.56	228.3	0.57	3*n*	OΣ
1860.95	211.3	0.58	3*n*	OΣ
1866.40	179.2	0.60	3*n*	OΣ
1869.54	167.5	0.54	2*n*	OΣ
1873.09	158.2	0.63	4*n*	OΣ
1875.41	141.9	0.69	8*n*	Δ
1878.10	140.3	0.65	2*n*	OΣ



μ^2 Bootis. Σ 1938

1878.52	132°.0	0″.62	6*n*	Δ
1881.50	121.9	0.62	3*n*	Hl
1882.60	116.5	0.67	3*n*	OΣ
1884.47	113.8	0.69	3*n*	Hl
1887.55	106.4	0.91	3*n*	HΣ
1888.44	100.2	0.60	4*n*	Hl
1889.35	97.8	0.73	3*n*	Maw
1889.91	100.0	0.84	4*n*	HΣ
1892.58	89.1	0.69	4*n*	Com
1893.49	85.4	0.57	1*n*	Ho
1896.00	83.5	0.68	6*n*	Com
1896.43	81.5	0.76	5*n*	Lv
1897.67	80.2	1.06	4*n*	Doo
1897.86	76.9	0.83	3*n*	A

1899.21	74°.7	0″.87	3*n*	A
1899.38	75.2	1.00	6*n*	Doo
1900.56	72.7	1.00	4*n*	Doo
1900.59	69.3	0.86	2*n*	Bryant
1901.49	75.1	0.91	2*n*	Bowyer
1902.51	72.2	1.08	4*n*	Gr. Obsy.
1903.37	67.9	1.05	3*n*	Do
1903.40	67.4	1.01	7*n*	Doo
1903.42	68.6	0.99	2*n*	A
1905.49	63.4	0.98	1*n*	β

The following orbits have been published:

1842	Hind	598.3 yrs.	*Mon. Not.* VII, 22; *A. N.* 549
1846	Hind	649.72	*Mon. Not.* VIII, 159
1846	Madler	146.65	*F. S.* I, p. 251
1848	Hind	458.65	*A. N.* 668
	Klinkerfues	198.93	
1872	Hind	314.34	*Mon. Not.* XXXII, 250
1872	Winagradsky	182.6	*Mem. de l' Univ. de Kasan*, 1874
1872	Doberck	290.07	*A. N.* 2026; *Trans. R. I. Acad.* XXV
1873	Wilson	200.4	*Mon. Not.* XXXIII, 460
1875	Plummer	266.0	*Oxford Obsns.* No. 1
1878	Doberck	280.29	*A. N.* 2194
1895	See	219.42	*Evolution of the Stellar Systems*
1896	Doberck	275.73	*A. N.* 3441

[Ma (**IX**, **XI**, **XIII**, **XV**) . . . Ma (304, 324, 452, 490) . . . Ma (*F. S.* **I**) . . . H^1 . . . H^2 . . . H (**II**, **VII**) . . . . Σ^1 . . . . Bond (*Am. Acad.* **II**, 144) . . . . Hind (549, 668) . . . . Hind (*Mon. Not.* **VII**, 22; **VIII**, 15, 53, 159; **IX**, 144; **XXXII**, 250) . . . Bp . . . Da^1 . . . Da^3 . . . Da^4 . . . WJ^2 . . . Se . . . Se^2 . . . Se (1614, 1735) . . . Hd . . . Flm . . . Wn (**V**) . . . K (1519) . . . En (1674, 2742) . . . Ba (**I**, **II**, **III**, **IV**) . . . Kn . . . WS . . . WS^2 . . . Gl . . . Sk . . . Sk^2 . . . Sk^3 . . . Du . . . Do (*Observatory* **II**, 212) . . . Do (2101, 2133, 2194, 2247, 2433, 3023, 3441, 3680, 3931) . . . Do (*Trans. R. I. Acad.* **XXV**, **XXIX**) (*Mon. Not.* **XXXV**, 373) . . . Wilson (*Mon. Not.* **XXXIII**, 412, 460) . . . Sp (2133) . . . Sp (**I**, **II**, **II** App.) . . . Pl . . . OΣ (**IX**) (**X**, pp. 93, 173) . . . Δ (1474, 1572, 1798, 1886, 1979, 2050, 2193) . . . Δ (**I**, **II**) . . . Perry (*Eng. Mech.* **XXXVIII**, 192; **XXXIX**, 415) . . . Schur (2255) . . . Je (2449, 2772) . . . Kustner (2584) . . . Per . . . Per (2559, 2742, 2748) . . . Hl (*Wash. Obsns.* 1880–86) . . . Hl (**I**, **II**) . . . Hl (*A. J.* 301) . . . T (2866, 2991) . . . Engelhardt (**II**) . . . β^1 . . . β^3 . . . β^4 . . . See (*Beob. Berlin*, No. 6, 1892) . . . Collins *A. J.* 278) . . . *Proc. Haverford Coll. Obsy.* 1892 . . . Jones (*A. J.* 312) . . . Winagradsky (*Mem. de l' Université de Kasan*, 1874) . . . Com (**VI**, **X**) . . . Glasenapp (**I**, **IV**) . . . Ho (3234) . . . Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800) . . . Sp (**III**) . . . Maw (**I**, **II**, **III**, **IV**) . . . Big . . . Big (*Bul. Ast.* **XII**, 299) . . . Sk^4 . . . Sk^5 . . . Everett (*Mon. Not.* **LVI**, 464) . . . Lv (*A. J.* 407) . . . See (3309) (*A. J.* 349, 378) (*Evolution of the Stellar Systems*) . . . Callandreau (*Bul. Ast.* **XII**, 523) . . . Knorre (3518) . . . A (3639) (*A. J.* 429) . . . Brown (3645) . . . Gl (*Mon. Not.* **LXI**, 556) . . . HΣ (**XII**) . . . Biesbroeck . . . Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I**, **II**) . . . . β^6 . . . . Lohse (*Pub. Potsdam Obsy.*) . . .]

(See p. 1077)

7260. **Hu 649.** No other measures. 20m 10s

[Hu (*Bul. L. O.* No. 57) . . .]

7261. **A 18.** No other measures. 20 18

[A (3635) (*Pub. A. S. P.* **XI**, 161) . . .]

7262. **Σ 1941.** No sensible change. Later observers make the angle smaller than Struve. 20 37

1868.54	226°.2	1″.58	4*n*	Δ
1880.39	227.4	1.31	1*n*	β
1888.19	226.8	1.55	3*n*	HΣ
1898.40	229.4	1.52	2*n*	Gla

[Ma (*F. S.* **I**) . . . . Ma (**X**, **XI**) . . . . Δ (**II**) . . . . Cin^5 . . . . β^3 . . . . Glasenapp (**V**) . . . . HΣ (**XII**) . . . .]

$20^{m}\ 41^{s}$ **7263.** **Σ 1940.** Probably without change.

1866.35	323°.7	1″.25	3*n*	Δ
1886.40	323.9	1.52	3*n*	T
1898.43	323.8	0.90	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...Se...T (2866)...Glasenapp (**V**)...]

20 43 **7264.** **Σ 1942.** Without change.

1867.14	93°.7	9″.04	3*n*	Δ
1898.39	92.4	9.14	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)... Cin⁵...Glasenapp (**V**)...]

20 58 **7265.** **Σ 1939.** (= **S** 671.) Without change.

1868.13	132°.2	9″.32	4*n*	Δ
1887.44	131.7	9.25	3*n*	T
1900.98	132.4	9.44	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Mh ... H (**VIII**) ... Δ (**II**)... T (2898)... Cin⁵... Glasenapp (**I**)...]

21 21 **7267.** **Innes 239.** With two later measures the mean is:

1901.75	358°.4	0″.42	3*n*	Innes

[Innes (3462) (*Mon. Not.* **LXI**, 599; **LXIII**, 76) (*Annals Cape of Good Hope* **II**)...]

21 40 **7268.** **Sh 202.** (= **H** V. 27 = σ 487.) The place in H is erroneous (see No. 7220), but there is no doubt of its identity with this pair. The proper motion is given by Porter:

A = 0″.339 in 172°.0
B = 0.355 in 158.4

The distance in H appears to be too small.

1782.36	130°.3	44″.42	1*n*	H	
1852.30	134.1	51.87	1*n*	OΣ	7.8...8.0
1879.74	133.4	51.90	3*n*	Doubiago	
1881.39	133.8	52.15	3*n*	β	7.2...7.5
1893.46	133.5	51.91	2*n*	Eng	
1904.33	133.6	51.88	3*n*	β	

As there has been no change in the last fifty years, evidently the proper motion is the same for each star.

[OΣ (**X**)...β⁴...Engelhardt (**III**)...β⁶...]

21 41 **7269.** **Σ 1943.** Without change.

1866.59	150°.1	5″.26	3*n*	Δ
1898.43	151.0	5.22	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)...Se... Δ (**II**)... Sp (**II**)... Glasenapp (**V**)... *Annals Toulouse Obsy.* **III**...]

21 42 **7270.** **β 1114.** (AC = **H** 4774.) B. A. C. 5090. The close pair was discovered with the 36-inch. So far there is no sensible change.

The Herschel companion seems to be fixed. The magnitude of A in Gould is 6.8.

A and B

1897.41	323°.1	0″.81	3*n*	A
1897.48	319.2	0.60	1*n*	See

AB and C (= H 4774)

1834.30	8°.5	10″ ±	1*n*	H
1878.90	7.0	9.06	2*n*	Cin
1897.39	5.4	8.90	2*n*	A

[β (**XVI**)...β (2956) (*Pub. L. O.* **II**)... A (3465)... See (3496)... Cin⁴...Cin⁶... Glasenapp (**I**)...]

7273. **Σ 1944.** Probably binary. Slow motion in angle, the distance remaining nearly constant. $21^{m}\ 47^{s}$

1832.40	341°.6	1″.34	4*n*	Σ
1842.44	339.1	1.30	2*n*	Ma
1849.74	336.3	1.27	4*n*	OΣ
1869.11	335.3	1.10	5*n*	Δ
1879.52	333.9	1.25	3*n*	Hl
1884.44	329.3	1.34	3*n*	Hl
1889.46	330.3	1.30	3*n*	T
1898.29	327.1	1.17	4*n*	Doo
1903.39	329.5	1.10	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Se...Se²...OΣ (**IX**)... Δ (1188, 2194)... Δ (**I, II**)....Do (2316)....Sk....WS²....Per....Per (2748)....Sp (**II**)....Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...T (3185)... Glasenapp (**I, IV**)... Flm... Lewis (*Mon. Not.* **LVI**, 359)... Brown (3645)...*A. G. Leipzig*, p. 249...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (2316, 3931)... Biesbroeck...]

7274. **Hu 650.** No other measures. 21 52

[Hu (*Bul. L. O.* No. 57)...]

7275. **A 82.** Other measures are: 21 53

1901.41	324°.6	0″.74	3*n*	Lewis

[A (3668)... Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIV**, 800)...]

7276. **OΣ 296.** Slow retrograde motion. The distance appears to be constant. The principal star is given a proper motion of 0″.178 in 106°.3 (Bossert). 22 18

1846.80	328°.9	1″.82	2*n*	Ma
1852.10	321.2	1.44	2*n*	OΣ
1866.70	319.4	1.52	3*n*	Δ
1872.29	317.4	1.64	4*n*	OΣ
1874.27	316.4	1.57	3*n*	Δ
1879.46	313.8	1.68	3*n*	Hl
1882.42	315.9	1.52	2*n*	Hl
1884.39	312.6	1.70	3*n*	Per
1886.50	309.6	1.59	3*n*	Hl
1893.48	310.5	1.55	2*n*	Maw
1898.34	306.2	1.65	3*n*	Hu
1901.16	304.4	1.65	3*n*	Doo

[Ma (**XI, XIII**) ... Da³... OΣ (**IX**)... Δ (**I**)... Do (2322)... WS² ... Sk ... Sk³... Per ... Per (2685, 2749) ... En (2786)... Flm... Hl (*Wash. Obsns.* 1882, 1884, 1886)....Hl (**I, II**).... Seagrave (*Sid. Mess.* **II**, 22)....Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIV**, 800)... Big (*Bul. Ast.* **XII**, 299)...HΣ (**XII**)...Hu (*Pub. L. O.* **V**)...Boeger (*A. J.* 522)...Biesbroeck ...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

22m 26s **7277.** **Σ 1945.** The change is due to the proper motion of A.

A and B

1830.35	273°2	30″70	3n	Σ
1844.69	276.9	30.47	3n	Ma
1867.18	282.6	30.82	4n	Δ
1887.46	287.7	31.98	2n	Hl
1904.26	291.7	32.47	2n	β

B and C

1830.35	280°4	8″75	3n	Σ
1867.18	281.9	8.66	4n	Δ
1887.46	280.6	9.08	2n	Hl
1904.26	281.3	9.00	2n	β

The faint star D was added by Hall. The only other measure is:

1904.23	28°3	22″79	1n	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... Δ (**II**) ... Δ (2194) ... Flm ... Pt ... Hl (**II**)... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... β6 ...]

22 44 **7279.** **Σ 1946.** Fixed.

1866.56	345°4	7″12	3n	Δ

[Ma (*F. S.* **I**)... Δ (**II**)... Cin5...]

23 25 **7282.** **Hu 150.** A later measure is:

1903.49	25°1	4″55	2n	Biesbroeck

[Hu (*A. J.* 485)... Biesbroeck...]

23 26 **7283.** **Σ 1948.** No material change.

1866.03	50°1	12″37	3n	Δ
1879.30	50.3	12.81	1n	β

[Ma (*F. S.* **I**)... H (**V**)... Δ (**II**)... Cin5... β3...]

23 41 **7284.** **Σ 1947.** Fixed.

1866.44	27°1	6″70	3n	Δ
1895.42	27.1	6.94	2n	Gla
1905.48	26.8	6.66	3n	Doo

[Ma (*F. S.* **I**)... Ma (**XIII**)... Se .. Du... Δ (**II**)... Glasenapp (**IV**)...]

23 50 **7285.** **H 253.** "*White : blue.*" I could not find this in or near this place (1877), and again in 1904 it was not seen with the 40-inch. Nothing in DM brighter than 9.5. Certainly error in H.

24 **7287.** **Lewis 13.** From *Mon. Not.* LXI, 486; approximate place. Probably identical with No. 7281, and the principal star much smaller.

24 17 **7288.** **Σ 3125.** No material change.

1867.50	271°0	2″27	3n	Δ
1905.18	267.4	1.98	1n	β

[Δ (**II**)... Cin5... β6...]

7289. **Ho 393.** Change in distance? 24m 21s

1891.97	275°3	3″71	4n	Ho	9.0...12.9
1902.46	281.9	6.10	1n	Hu	9.5...13
1903.97	286.8	6.14	2n	β	9.2...13

[Ho (3233)... Hu (*Bul. L. O.* No. 44)... β6...]

7291. **H 2784.** "C est. from diagram." These are all the measures: 24 40

AB	1879.27	228°6	17″36	1n	β	9.5...10.5
	1900.34	229.4	17.28	1n	Espin	9.0...13.0
AC	1879.27	10.8	41.36	1n	β	...11.0

[β3... Espin (*Mon. Not.* **LXIV**, 679)...]

7292. **H 254.** The only measures are: 24 42

AB	1904.23	279°1	17″07	1n	β6	8.9...9.0
BC	1904.23	3.2	64.11	1n	β6	...10.5
BD	1904.23	261.6	72.66	1n	β6	...11.3

7293. **β 33.** (CD = **β 34.**) Discovered with the 6-inch. Apparently fixed. 24 43

A and B (= β 33)

1878.49	43°0	2″94	2n	Cin
1892.40	42.1	3.08	2n	Lv
1898.04	41.4	2.74	5n	Doo
1898.44	41.8	2.95	3n	A
1901.44	41.0	2.76	3n	Doo

C and D (= β 34)

1898.04	55°2	6″54	5n	Doo
1901.41	55.7	6.69	2n	Doo

A and E

1898.27	132°2	31″52	4n	Doo	...12.3
1901.41	132.1	31.37	2n	Doo	

[β (**I**).... β (*Mon. Not.* **XXXIII**, 351).... Δ (**I**).... Cin5.... LM.... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892).... A (3585).... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

7294. **S 672.** (= **H 4783.**) Without change. 24 50

1836.78	281°7	11″06	2n	H	6 ...10
1890.39	279.6	10.95	2n	Gla	6.8... 9.1
1903.48	281.1	10.93	1n	Scott	6.8... 8.5

[H3.... Se1.... Se3.... Ra (**XXI**).... Cin4.... Cin5.... Glasenapp (**I**).... Scott (*Mon. Not.* **LXIV**, 52)...]

7295. **Σ 1950.** *Coronae* 17. (= **H 2783.**) Fixed. 24 50

1867.47	93°4	3″06	4n	Δ
1896.62	90.2	3.23	3n	A

[Ma (*F. S.* **I**)... Ma (**X, XI**)... Da2... Da3... Se... Ra (**XXV**)... WS... WS2... Gl ... Δ (1125, 1188)... Δ (**I, II**)... Glasenapp (**I, IV**)... A (3395)... *Annals Toulouse Obsy.* **III**...]

7296. **Σ 1949.** Fixed. 24 59

1867.34	214°1	16″17	3n	Δ
1879.30	213.3	16.37	1n	Cin

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Cin5...]

(See p. 1077)

$25^m\ 18^s$ **7297.** **Σ** 1951 *rej.* (= **Ho** 394.) L 28291. Ma has an angle, 194°.5 (1854.43) 1*n*, credited to this pair, but it appears to belong to Σ 1954. The later measures are:

1903.30	309°.0	12″.52	3*n*	Doo
1905.29	308.0	12.57	1*n*	β

[Ma (XV)...Ho (3234)...β^6...]

25 34 **7298.** **Hu** 651. No other measures.

[Hu (*Bul. L. O.* No. 57)...]

25 34 **7299.** **β** 944. Discovered with the 18½-inch. Apparently fixed. Magnitude in DM 6.7; Lalande 6. The later measures are:

1891.26	126°.7	10″.98	3*n*	β
1899.08	126.6	10.53	1*n*	β
1901.45	127.3	10.67	3*n*	Doo

[β (XIII)...β^3...β (3114) (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

(See p. 1077)

26 3 **7301.** **See** 238. (AB = **S** 673.) The preceding star of S 673 was found to be a close pair at the Lowell Observatory in 1897. The only later position is:

1900.51	146°.5	0″.30	2*n*	Cogshall

There is no change in the wide pair.

A and BC

1877.45	298°.6	9″.18	2*n*	Cin	7.5...7.5
1890.40	298.6	8.72	2*n*	Gla	6.7...6.8
1900.51	299.4	9.06	2*n*	Cg	

[H (VIII)....H^1.... Bp.... Cin^4....Glasenapp (I)....See (*A. J.* 431)....Cogshall (*A. J.* 505)...]

26 6 **7302.** **β** 945. Discovered with the 18½-inch. The large star has a considerable proper motion:

Stumpe	0″.304 in 297°.4	
Krueger	0.295 in 298.5	
Porter	0.308 in 299.1	

It is probable that this is only an optical pair, as the change corresponds very nearly to the proper motion of A. The following are all the later measures:

1891.42	25°.5	15″.89	2*n*	β
1896.49	30.8	15.68	3*n*	A
1896.51	31.8	16.03	2*n*	Lv
1898.57	34.3	16.09	3*n*	A
1901.48	34.7	16.03	3*n*	Doo
1905.46	42.1	16.08	3*n*	Doo

[β (XIII)....β^3....β (3114) (*Pub. L. O.* **II**)....A (3395, 3585)....Lv (*A. J.* 407).... Doolittle (*Pub. Flower Obsy.* **II**)...]

26 8 **7303.** **Σ** 1952. Since Part I was in type, Aitken has found that the principal star of Σ 1952 is a close pair.

A and B

1905.47	22°.5	0″.51	3*n*	A	8.5...10.2

There is no change in the Struve companion.

AB and C

1866.15	221°.3	16″.02	3*n*	Δ
1904.36	221.8	16.25	2*n*	β
1905.45	222.0	16.18	2*n*	A

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Cin^5...β^6...]

(See No. 13312)

7304. **Ho** 549. The only other observation is: $26^m\ 8^s$

1902.35	74°.4	0″.56	4*n*	Doo

[Ho (3557)...]

7306. **OΣ (App)** 140. B is Lalande 28310. The later measures show no change. 26 38

1901.49	179°.7	112″.14	2*n*	β

[Δ (I)...β^5...]

7307. **Σ** 1953. Fixed. 27 1

1867.76	254°.8	6″.47	3*n*	Δ

[Ma (*F. S.* I)...Ma (XI)...Se...Δ (II)...*A. G. Leipzig*, p. 249...]

(See p. 1077)

7308. **Hu** 577. A later position is: 27 27

1903.46	20°.6	0″.37	3*n*	Gr. Obsy.

[Hu (*Bul. L. O.* No. 27)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 800)...

7310. **Σ** 1958. Fixed. 28 20

1867.43	339°.3	29″.71	4*n*	Δ
1879.30	338.7	29.76	1*n*	β

[Ma (*F. S.* II)...Δ (II)...Cin^5...β^3...]

7312. **Hn** 122. No other measures: 28 26

[*Pub. Washburn Obsy.* **II**...Com (VI)...]

(See p. 1077)

7313. **Σ** 1955. (= **S** 377.) Without change. The faint star was added by Tarrant. 28 47

1867.22	237°.7	7″.68	3*n*	Δ
1904.30	237.1	7.68	2*n*	β

The only other measure of C is:

1904.30	37°.6	20″.00	2*n*	β	...13.2

[Ma (*F. S.* I)...Ma (XI)...Se...Δ (II)...T (2991)...β^6...]

7314. γ *Librae.* Faint star noted by Goldschmidt. The large star has a proper motion of 0″.057 in 70°.6 (Auwers). No other measure but the following: 28 48

1901.84	152°.7	41″.92	2*n*	β

[Goldschmidt (*Intellectual Observer*, **III**, 388) (*Comp. Rend.* **LVI**, 845)...β^1... β^5...]

29m 2s **7317.** **Σ 1956.** There may be some change in the distance.

1867.84	38°8	2″35	4*n*	Δ
1875.52	39.5	2.31	1*n*	OΣ
1876.86	40.1	2.24	4*n*	Sp
1885.46	38.4	2.26	3*n*	Per
1895.53	42.4	1.96	2*n*	Collins
1896.58	40.4	2.29	2*n*	Hu
1903.40	38.9	1.77	3*n*	Do
1905.24	39.2	1.71	1*n*	β

[Ma (*F. S.* **I**)...Se...OΣ (**IX, X**)...Du...Δ (**II**)...Sk^3...Sp (2133)....Sp (**II**)...Per...Per (2748)...Collins (*A. J.* 378)...Hu (*A. J.* 397)..Glasenapp (**IV**)...Boeger (*A. J.* 522)...Do (3931)....β^6...]

29 5 **7318.** δ *Serpentis.* **Σ 1954.** (= **H I. 42** = **Sh 205.**) Probably binary, but the motion is extremely slow. The maximum distance seems to have been reached. The proper motion is small, 0″087 in 286°0 (Auwers).

1833.07	197°3	2″66	5*n*	Σ
1836.30	196.9	2.57	3*n*	Σ
1841.06	195.7	2.97	5*n*	Da
1854.55	193.1	3.12	3*n*	Ma
1865.36	192.0	3.20	10*n*	Δ
1875.30	190.5	3.16	4*n*	Δ
1887.00	189.2	3.48	6*n*	Hl
1895.59	186.4	3.49	2*n*	Collins
1896.48	186.1	3.47	5*n*	Hu
1903.45	186.8	3.65	3*n*	Furner
1905.48	185.0	3.49	4*n*	β

[Ma (*F. S.* **I**)...Ma (324)...Ma (**IX, X, XI, XIII, XV**)...BM (280)...H^1...H^2...Bp...Da^1...Da^3...Da^4...Mh...P^1...K...K (1519)...Wr...Wr (*Phil. Trans.* 1851)...Se...Se^2...Se^3...Se (975)...Se (*Comp. Rend.* **XLI**, 271)...Ba (**II, III, IV**)....Ra (**XXII, XXVII–XXXV, XXXVIII**)....Hd....En (1518, 1674)...Flm...Kn...WS...WS^2...Gl...Sk...Sk^2...Sk^3...Du...Bl...Pl...Pk....Pt....Do (2198, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Cooper (2155)....Sp (2133)....Sp (**II**)....Je (2351, 2449, 2772)....Goldney (2257)....Δ (*Mem. Accad. Sci.*)...Δ (1031, 1114, 1192, 1474)...Δ (**I, II**)...OΣ (**IX, X**)...Kustner (2584)...Per...Per (2559, 2685)...Perry (*Eng. Mech.* **XXXVIII**, 192)...de Ball (2753)...Callandreau (*Bul. Ast.* **XII**, 523)...Hayn (3051)...T (2991)....Hl (*Wash. Obsns.* 1884, 1886)....Hl (**I, II**)....See (*Beob. Berlin* No. 6, 1892)...Maw (**I, IV**)...Glasenapp (**I, III, V**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LX**, 506; **LXIII**, 403; **LXIV**, 800)....Searle (*A. J.* 299)....Big....Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....Knorre (3300, 3518)....Giacomelli (**II**)...Hu (*A. J.* 397)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Boeger (*A. J.* 522)...Thiele (3837)...Biesbroeck...β^6...]

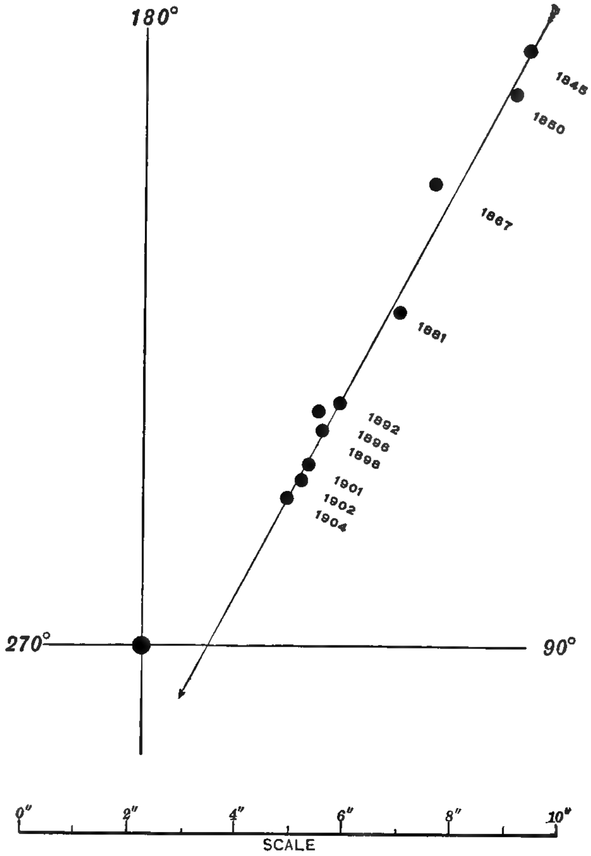
29 39 **7319.** **Hu 746.** With three later measures the mean is:

1904.56	218°9	1″87	4*n*	Hu	8.6...12.8

[Hu (*Bul. L. O.* No. 65)...]

29 40 **7320.** **OΣ 297.** Change from proper motion. Hussey, from the measures of the companion to 1898, finds 0″155 in 152°2 for the proper motion of A. The minimum distance will be about 1″.

1845.84	147°2	13″31	2*n*	OΣ
1850.40	146.1	12.53	1*n*	OΣ
1867.00	147.7	10.23	2*n*	Δ
1881.54	142.4	7.88	1*n*	Pt
1892.88	140°9	5″86	2*n*	Ho
1896.51	142.8	5.55	3*n*	A
1898.40	140.2	5.26	3*n*	Hu
1901.34	137.3	4.61	3*n*	β
1902.85	136.1	4.31	4*n*	Doo
1904.42	135.9	3.90	3*n*	Doo



OΣ 297

[OΣ (**IX**)....Δ (**I**)....Flm....Pt....Ho (3234)....Big (*Bul. Ast.* **XII**, 299)....A (3395)...Lv (*A. J.* 407)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...β^6...]

7321. **See 241.** The only other measures are: 29m 44s

1900.46	25°7	0″70	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7322. **Σ 1959.** Without change. 29 58

1868.27	240°9	2″00	4*n*	Δ
1878.41	242.3	2.08	1*n*	β
1895.42	243.0	2.00	1*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XIII**)...Δ (**II**)...Cin^5...β^1...Glasenapp (**IV**)...]

$30^m\ 13^s$ **7323.** Σ 1957. Fixed. The later measures indicate that Struve's angle is too large, and that there has been no real change.

1842.42	158°.4	1″.37	2*n*	Ma
1843.40	157.6	1.25	2*n*	Ma
1864.70	155.6	1.41	3*n*	Δ
1878.52	157.7	1.35	4*n*	Sp
1881.99	159.3	1.24	6*n*	Hl
1888.15	156.3	1.26	2*n*	HΣ
1901.94	153.4	1.20	6*n*	Bowyer

[Ma (*F. S.* **I**)....Ma (**X, XI, XIII, XV**)...Se...Δ (1474)...Δ (**II**)...Flm...WS...WS2...Gl...Sk...Sk2...Sp (**II**)....Hl (*Wash. Obsns* 1884)...Hl (**I, II**)...T (3185)...Collins (*A. J.* 378)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Glasenapp (**V**)...HΣ (**XII**)...]

30 17 **7324.** **Howe** 35. From Cin1. No measures.

30 25 **7325.** **See** 242. (= **Innes** 243.) The only other measures are:

1900.47	5°.4	0″.64	2*n*	Cogshall

[See (*A. J.* 432)...Innes (3462)...Cogshall (*A. J.* 505)...]

30 29 **7326.** Σ 1961. The motion is rectilinear. Flammarion gives the movement as 0″.089 in the direction of 332°.

1830.65	56°.0	21″.55	2*n*	Σ
1868.21	47.5	22.21	4*n*	Δ
1878.29	44.6	22.45	1*n*	β
1888.64	42.7	22.86	2*n*	HΣ
1896.51	41.0	23.29	1*n*	Hu
1900.61	39.8	23.06	3*n*	Doo
1903.40	40.3	23.34	3*n*	Do

[H2...Ma (**XIII, XV**)...Ma (*F. S.* **II**,...Δ (1800)...Δ (**II**)...Flm...Sk3...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (3023, 3931)...β1...Hu (*A. J.* 397)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

30 39 **7327.** **H** 2788. "Splendid." B is DM (45°) 2304, 4.8 *p*, and 0′.6 *n*. Nothing but this since Herschel:

1903.31	304°.9	57″.93	2*n*	β^6	8.5...8.5

30 46 **7328.** **Ho** 63. Apparently unchanged.

1893.44	306°.1	1″.04	2*n*	Ho
1902.38	305.2	1.21	4*n*	Doo

[Ho (2678, 3234, 3558)...]

30 49 **7330.** Σ 1960. Without change.

1867.76	319°.7	11″.94	3*n*	Δ
1901.43	319.7	12.19	2*n*	Kustner

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...Glasenapp (**V**)...*A. G. Leipzig*, p. 249...Kustner (3821)...]

31 46 **7332.** OΣ 298. A most interesting binary system. More than a complete revolution has been made since the first measures in 1843. The period is about 56 years. The system has a large proper motion of 0″.514 in 278°.3 (Porter).

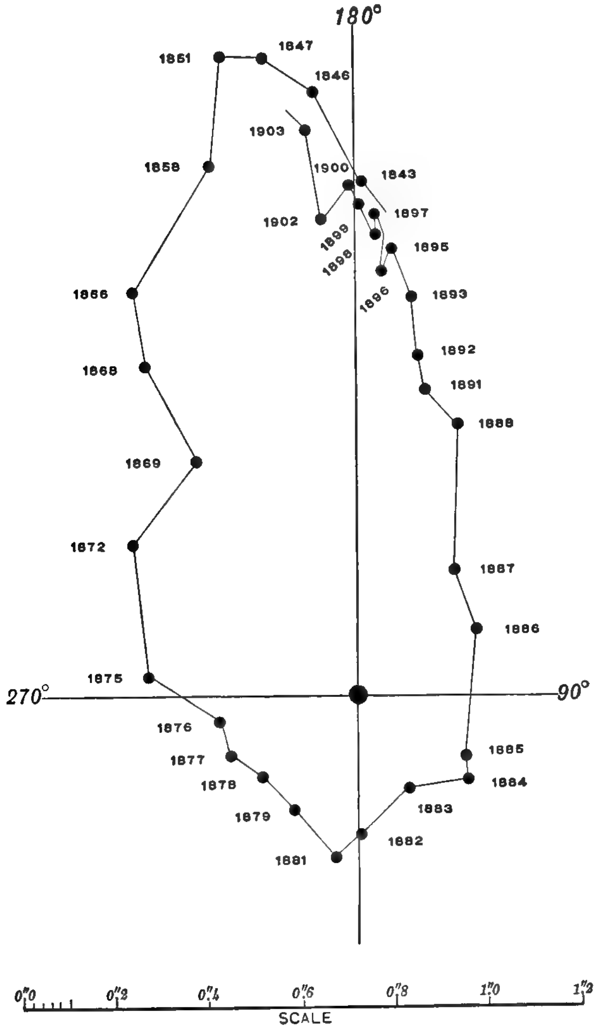
Six orbits have been published:

1878	Doberck	68.80 yrs.	*A. N.* 2280
1879	Beebe	79.2	*Am. Jour. Sci.* July, 1879
1882	Dolgorukow	70.26	*A. N.* 2531
1887	Celoria	56.65	*A. N.* 2843
1895	See	51.0	*Evolution of the Stellar Systems*
1895	See	52.0	

The principal measures are shown on the diagram. A mean is given of the bracketed observations.

1843.34	179°.3	1″.11	4*n*	Ma
1846.26	186.5	1.40	2*n*	Ma
1846.49	181.6	1.20	3*n*	OΣ
1847.35	188.2	1.38	2*n*	Ma
1851.73	191.8	1.40	2*n*	Ma
1858.83	195.2	1.18	4*n*	OΣ
1866.47	208.9	0.99	3*n*	Δ
1868.52	212.5	0.84	1*n*	OΣ
1869.46	214.1	0.61	3*n*	Da
1872.58	235.8	0.58	1*n*	OΣ
1875.52	264.3	0.53	1*n*	OΣ
1875.65	265.5	0.37	2*n*	Δ
1876.47	280.9	0.3±	3*n*	Δ
1877.53	295.8	0.3±	5*n*	Δ
1878.33	310.7	0.27	2*n*	β
1879.46	335.0	0.26	4*n*	Hl
1879.49	327.8	0.3±	4*n*	Sp
1881.41	355.4	0.35	3*n*	Hl
1881.42	350.3	0.36	3*n*	β
1882.47	7.5	0.3±	4*n*	Sp
1882.52	359.5	0.30	3*n*	En
1882.55	358.0	0.3±	1*n*	OΣ
1883.52	22.4	0.3±	6*n*	Sp
1883.65	36.7	0.17	3*n*	En
1884.44	49.0	0.30	2*n*	Per
1884.51	57.3	0.3±	5*n*	Sp
1885.65	60.9	0.27	7*n*	En
1886.67	133.7	0.3±	2*n*	Sp
1886.68	104.9	0.29	7*n*	En
1887.50	142.0	0.39	3*n*	Hl
1887.56	143.0	0.3±	6*n*	Sp
1888.54	159.4	0.63	1*n*	OΣ
1891.48	167.2	0.68	3*n*	Hl
1892.42	169.9	0.82	1*n*	Collins
1892.45	170.2	0.90	4*n*	Big
1892.57	168.9	0.64	4*n*	Com
1893.40	171.7	0.94	1*n*	Jones
1893.46	170.6	1.03	1*n*	Lewis
1893.71	173.6	0.64	1*n*	Com
1894.51	173.4	1.12	2*n*	Big
1895.54	173.1	0.85	3*n*	Com
1895.74	179.4	0.95	2*n*	See
1896.49	178.9	0.79	3*n*	Com
1896.51	173.9	1.05	1*n*	Hu
1897.42	174.8	0.92	4*n*	Gr. Obsy.
1897.45	179.0	0.89	2*n*	Gla
1897.59	180.1	1.23	5*n*	Doo
1897.86	176.9	1.11	3*n*	A
1898.32	176.4	1.05	3*n*	Hu
1898.53	178.4	0.96	2*n*	Gr. Obsy.
1899.21	178.6	1.08	3*n*	A
1899.40	180.6	1.16	5*n*	Doo
1899.49	179.6	1.00	2*n*	Gr. Obsy.
1899.66	179.4	0.99	3*n*	Hu

1900.54	181°.2	1″.21	4*n*	Doo
1900.97	180.1	0.99	5*n*	Gr. Obsy.
1901.41	184.8	0.93	3*n*	Gr. Obsy.
1902.57	183.4	1.13	3*n*	Gr. Obsy.
1903.36	184.5	1.16	3*n*	Gr. Obsy.
1903.36	184.2	1.23	2*n*	Do
1903.40	185.9	1.27	10*n*	Doo



OΣ 298

There is a distant 7m star, first measured by OΣ, which has the same proper motion. There is no change in its position with reference to the close pair.

1867.15	328°.1	121″.99	5*n*	OΣ
1877.18	328.1	121.84	3*n*	Δ
1894.54	327.9	122.01	1*n*	Big
1898.32	327.9	122.04	3*n*	Hu
1903.36	327.9	121.90	2*n*	Do

[Ma (*F. S.* **II**, 233)... Ma (**XI**, **XIII**) ... OΣ (**IX**)(**X**, pp. 30, 195) ... Da³... Du ... Flm... Δ (I) ... Δ (2193)... Sp (**I**, **II**, **II** App) ...WS...WS²...Sk...**Hl** (*Wash. Obsns.* 1881)...Hl (**I**, **II**)...Hl (*A. J.* 301)... Per... Per (2685)...β¹...β⁴... Do (2280, 2433, 3023, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Kustner (2584) .... En (2678, 2742, 2786) .... Beebe (*Am. Jour. Sci.* July, 1879) .... Celoria (2843) ... Dolgorukow (2531) ... Collins (*A. J.* 278) ... *Proc. Haverford Coll. Obsy.* 1892...Jones (*A. J.* 312)...Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800).... Big .... Big (*Bul. Ast.* **XII**, 299).... Everett (*Mon. Not.* **LVI**, 464).... See (*A. J.* 359, 378) (*Evolution of the Stellar Systems*).... Com (**X**).... Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I**, **II**) ... Brown (3645)... Maw (**III**, **IV**)... Glasenapp (**V**)... HΣ (**XII**)... A (3639) (*A. J.* 427)... Hu (*Pub. L. O.* **V**)... Boeger (*A. J.* 522)... Biesbroeck... Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1077)

7333. **OΣ 299.** Unchanged. 32m 7s

1868.02	23°.7	3″.20	4*n*	Δ
1897.99	22.5	3.40	3*n*	Hu
1901.17	19.1	3.30	3*n*	Doo
1903.40	23.5	3.34	3*n*	Do

[Ma (**XI**, **XIII**)... OΣ (**IX**)... Δ (I)... Seagrave (*Sid. Mess.* **II**, 22)... En (2678)... Hu (*A. J.* 397) (*Pub. L. O.* **V**)... Brown (3645)... HΣ (**XII**)... Boeger (*A. J.* 522)... Do (3931)... Doolittle (*Pub. Flower. Obsy.* **II**)...]

7334. **Σ 1962.** *Librae* 178. (= **H N. 33** = **Sh 206.**) Without change. 32 11

1868.25	188°.5	11″.98	5*n*	Δ
1878.49	187.8	11.99	1*n*	β
1890.38	187.8	11.92	7*n*	Giacomelli
1903.46	188.3	11.89	5*n*	Jouffray

[Ma (**XI**)... Ma (324)... Ma (*F. S.* **I**)... H (**VIII**)... Mh... Se... Wr... Wr (*Phil. Trans.* 1851)... Ra (**XXIV**)... Δ (1192)... Δ (**I**, **II**)... O. Stone (2201)... β¹... Pt... Cin⁵... T (2898) ... Scott (*Brit. Ast. Ass'n* **V**, 75) ... Glasenapp (I) ... *Annals Toulouse Obsy.* **III**... Giacomelli (**III**)... Jouffray (*Bul. Ast.* **XXI**, 299) ... Coleman (*Mem. R. A. S.* **LIV**)...]

7336. **β 121.** **B. A. C. 5163.** Discovered with the 6-inch. Unchanged. 32 20

1889.47	277°.5	1″.45	3*n*	β	8.2...8.2
1890.45	101.8	1.65	2*n*	Gla	7.2...7.3
1898.48	275.1	1.66	2*n*	Doo	8.3...8.4
1905.16	277.4	1.82	3*n*	Doo	8.3...8.3

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59)... β (2957) (*Pub. L. O.* **II**)... Cin³... Cin⁴... Cin⁵... Lv¹... Glasenapp (I)... Doolittle (*Pub. Flower Obsy.* **I**, **II**)...]

7337. **See 243.** (**= Innes 244.**) Later measures: 32 33

1900.46	29°.1	0″.86	3*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 505)... Innes (3462)...]

7338. **Σ 3094.** Fixed. 32 39

1870.01	298°.3	2″.31	5*n*	Δ
1890.48	295.3	2.55	2*n*	Gla

[Ma (*F. S.* **II**).... Se.... Δ (**II**).... Cin⁶.... Glasenapp (I).... *Annals Toulouse Obsy.* **III**...]

7339. **Howe 36.** (= **Ho 395**.) Discovered by Howe at Cincinnati. His place is 5m too large in R. A. No motion. 32 42

1892.47	197°.9	2″.22	3*n*	Ho	8.0...9.5
1903.83	197.8	2.49	6*n*	Doo	

[Cin¹... Wilson (Cin¹⁰)... Ho (3234)...]

$32^{m}\,59^{s}$ **7340. β 122.** (= **Hd 140.**) Discovered with the 6-inch. Probably without change. The small difference in the magnitudes is probably the explanation of the quadrants assigned by the several observers. This pair is $2^{m}\,3^{s}$ *p κ Librae* and 5′ *s*. It is found in the subsequently published Harvard observations.

1877.39	203°6	1″96	2*n*	Cin	7.6...7.7
1881.03	26.7	1.99	2*n*	Sp	7.0...7.5
1887.90	25.4	1.75	4*n*	T	7.0...7.4
1890.40	26.1	2.03	2*n*	Gla	7.5...7.7
1897.49	208.0	1.84	2*n*	Scott	7 ...7½
1901.47	26.8	1.90	2*n*	Doo	7.1...7.5

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...Δ (2086)...Cin⁴...Hd...LM...Lv¹....T (2899, 2991)....Sp (**II**).... Glasenapp (**I**) ... Sellors (3303).... Scott (*Mon. Not.* **LIX**, 427)...Doolittle (*Pub. Flower Obsy.* **II**)...]

33 1 **7341. Σ 1963.** (= **H I. 18.**) Without change.

1867.99	292°6	4″37	4*n*	Δ
1885.42	292.9	4.75	3*n*	Per
1895.40	292.5	4.61	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... H¹ ... Wr... Se...Ra (**XXIII**)...Du...Δ (1125)...Δ (**I, II**)...Per...Per (2748)...T (2991)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

33 10 **7342. Weisse 29.** "Duplex?" in W². Examined with the 40-inch in 1901; not double, and no near companion.

[β⁵...]

33 35 **7343. Hn 25.** Later measures with the same instrument:

1888.47	311°8	1″42	3*n*	Com

[β⁴...Com (**VI**)...]

33 41 **7344. Σ 1964.** (AC = **H IV. 61** = **H 255** = **S 674.**) Since Part I of this catalogue was in type, Hussey has found that the principal star of Σ 1964 is also a close pair.

A and B

1905.39	89°2	0″85	2*n*	Hu

There is no material change in the Struve components:

AB and C

1866.23	86°2	15″19	3*n*	Δ
1879.38	87.3	15.26	2*n*	β
1904.05	86.9	15.25	3*n*	Doo

C and D

1870.04	11°0	1″37	5*n*	Δ
1879.38	9.6	1.24	2*n*	β
1900.78	12.6	1.30	8*n*	Doo

[Ma (*F. S.* **I**)...Ma (324)...Ma (**X, XI, XIII**)...H¹...H²...H (**VII**)...Δ (**II**)...β¹... β³... Glasenapp (**V**) ... *Annals Toulouse Obsy.* **III** ... Doolittle (*Pub. Flower Obsy.* **II**)...]

(See No. 13319)

33 49 **7345. Hu 652.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

7346. H 256. This pair was subsequently looked for by Herschel and not found. I could not find anything in or near this place agreeing with the description. There is certainly some error in the place given by Herschel. $34^{m}16^{s}$

[H (*Mon. Not.* **XXXII**, 29)...β (*Mon. Not.* **XXXIV**, 376)...]

7347. Howe 37. No evidence of change. The quadrant seems to be uncertain. 34 20

1879.38	88°7	5″43	2*n*	Cin	7.7...8.0
1885.32	271.0	5.43	1*n*	W	8.5...9.5
1903.26	88.7	5.57	3*n*	Doo	8.0...8.0
1903.57	270.1	5.40	2*n*	Scott	7.5...8.0

[Δ (**I**)...Cin⁵...Wilson (Cin¹⁰)...Lv¹...Scott (*Mon. Not.* **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7348. A. G. 197. "Duplex?" in *A. G. Berlin.* 34 30

1902.73	129°9	2″65	3*n*	Miller

[Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...]

7349. OΣ 300. Without change. 34 30

1866.68	259°9	15″01	3*n*	Δ
1898.39	261.2	15.32	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**) ... Per ... Per (2749) ... Glasenapp (**V**)...*A. G. Leipzig*, p. 209...Hu (*Pub. L. O.* **V**)...]

7350. Arg. 28. "Duplex" in O. Arg. S. Measures from Cin⁶. The only other measures are by Miller: 34 30

AB	1904.49	25°4	34″43	2*n*	M	8.2... 9.0
AC	1904.49	327.3	34.95	2*n*	M	...11.7
AD	1904.49	322.2	88.75	3*n*	M	... 9.6

7351. H 2789. The only measures since H are from the Kirkwood Observatory: 34 32

1904.49	308°4	28″36	3*n*	Miller	8.5...9.0

7352. *ζ Coronae.* **Σ 1965.** (= **H II. 8** = **Sh 208**). There is no change, but a common proper motion of 0″026 in 267°8 (Auwers). The measures are far more numerous than the subject warrants, considering the well-known fixity of these stars. 34 52

1868.70	302°2	6″21	4*n*	Δ
1886.46	301.8	6.28	7*n*	Hl
1890.38	302.2	6.27	4*n*	Giacomelli
1903.39	304.3	6.15	2*n*	Biesbroeck

[Ma (*F. S.* **I**, 161, 263)...Ma (324)...Ma (**IX, X, XI, XIII**)...BM (280)...H (**II, VII**)... H²... Bes... Mh... Da²... Da³... Da⁴... K ... K (409)... *Durham Obsns.* 1846–48... P¹... Ek (**I, II**) ...Wr... Auwers (1393)... Lu (1103) ... Lu (**I, II, III**)....Se....Se²....En (1518, 1694, 2677, 2786).... Ba (**I, II, III**)....Ra (**XXII, XXIX**)....Wh....Flm....Du....Pk....Hd....OΣ (**IX, X**)....Δ (*Mem. Accad. Sci.*)....Δ (1032)....Δ (**I, II**)....Do (2198, 3023, 3680) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Waldo (2190)....Hl (*Wash. Obsns.* 1876, 1884)....Hl (**I, II**)...Bl (**V**)...Pt...Je (2351, 3802)...Goldney (2257)...Kustner (2584)....Franz (2590)....Per....Per (2685, 2748)....Giacomelli (**III**)....Sp (**II**)....T (2866)....See (*Beob. Berlin*, No. 6, 1892)....Hayn (3051)....Maw (**I**)....Searle (*A. J.* 299)...Glasenapp (**III, V**)... Big... Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)... Chofardet (3450) ... Coleman (*Mem. R. A. S.* **LIII**)... *Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Thiele (3837)...Biesbroeck...]

35^{m} 26^{s} **7354.** **Σ 1966.** (= **Sh 207.**) Fixed.

1867.08	52°4	22″94	3*n*	Δ
1901.47	52.4	23.17	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VIII**)...Δ (**II**)...Cin⁵...Glasenapp (**I**)...]

35 27 **7355.** **Hu 653.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

35 46 **7356.** **See 246.** A later position is:

1900.44	311°6	13″47	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

35 56 **7357.** **Hn 123.** No other measures.

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

36 0 **7358.** **β 354.** Discovered with the 6-inch. Very little, if any, change.

1877.41	285°6	5″37	2*n*	Cin	7.9...8.7
1890.42	287.7	5.32	2*n*	Gla	7.4...9.2
1900.36	288.8	5.63	6*n*	Doo	7.0...9.1
1901.46	289.5	5.54	3*n*	Doo	

[β (**VI**)....β (2062)....Cin³....Cin⁴....Glasenapp (I).... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

36 1 **7359.** **β 35.** **B. A. C. 5184.** Discovered with the 6-inch. Without sensible change, but the components have a common proper motion of 0″185 in the direction of 250°5 (Porter), and hence probably a physical pair. Lalande 28591 = Piazzi XV, 150.

1877.42	97°4	2″53	2*n*	Cin
1887.89	99.2	2.33	4*n*	T
1890.41	102.4	2.64	2*n*	Gla
1902.43	99.0	2.51	7*n*	Doo
1905.38	100.4	2.38	1*n*	A

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...Δ (I)...Δ (2081)...Cin⁴...LM...T (2899, 2991)...Glasenapp (I)...Scott (*Mon. Not.* **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

36 12 **7360.** *ι Serpentis.* **Hu 580.** A very close pair, discovered with the 36-inch. This star has a proper motion of 0″096 in 253°0 (Auwers).

1903.46	67°2	0″25	2*n*	Bowyer

[Hu (*Bul. L. O.* No. 27) (*Pub. A. S. P.* **XIV**, 140)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 800)...]

(See p. 1077)

36 12 **7361.** **OΣ (App) 141.** B is R 3433. Change in distance. Franz measures a more distant 7m star, 335°2 : 235″15 (1883.48) 2*n*.

1883.03	205°4	91″64	4*n*	Franz
1904.31	205.3	90.84	2*n*	β

There is a 13.5m star from A, 158° : 37″9.

[Δ (I)...Franz (2649)...β⁶...]

(See p. 1077)

7362. *π¹ Ursae Minoris.* **Σ 1972.** (= **♅ IV. 90** = **Sh 210.**) No material change, but common proper motion: 36^{m} 13^{s}

Stumpe	0″225 in 296°7
Bossert	0.206 in 309.1

1865.84	82°1	30″57	4*n*	Δ
1893.67	80.9	30.74	2*n*	Eng
1897.48	81.2	30.77	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Ra (**XXIV**)...Flm...Δ (1192, 1572)...Δ (**I, II**)...Dunkin (*Mon. Not.* **XXXVIII**, 22)...Je (2449, 2772)...Big...Engelhardt (**III**)...Maw (**II**)...Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**...]

7363. **Perry.** Discovered by Rev. J. J. M. Perry. Identified as here given, and measured: 37 5

1903.32	112°0	5″20	2*n*	β	9.3...13.1

[Perry (*Eng. Mech.* **XXXV**, 260)...β⁶...]

7366. **Hu 654.** No other measures. 37 26

[Hu (*Bul. L. O.* No. 57)...]

7367. **β 619.** Discovered with the 18½-inch. Lalande 28656. Change uncertain. 37 34

1878.35	359°7	0″58	2*n*	β	6.5...7.0
1878.46	354.0	0.38	2*n*	Δ	6.2...6.2
1883.49	353.7	0.45	3*n*	Sp	6.5...6.5
1884.17	364.7	0.33	6*n*	En	6.0...6.4
1885.52	361.8	0.45	2*n*	HΣ	
1887.61	358.4	0.47	6*n*	Sp	
1888.39	360.6	0.63	2*n*	Lv	6.0...7.0
1888.66	358.1	0.54	3*n*	T	6.5...7.0
1891.29	359.8	0.59	3*n*	β	6.9...7.7
1894.50	3.1	0.55	1*n*	Sp	
1901.36	5.7	0.50	3*n*	A	
1901.56	6.8	0.47	9*n*	Bryant	
1905.39	4.6	0.54	5*n*	Doo	

[β (**X**)...β¹...β (3114) (*Pub. L. O.* **II**)...Δ (I)...Sp (**II, III**)...HΣ (**XII**)...En (2678)...Lv¹...T (2991)....Do (3680)...Doolittle (*Pub. Flower Obsy.* **II**)...A (*Bul. L. O.* No. 11)....Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)...]

7368. *γ Coronae.* **Σ 1967.** The plane of the orbit of this binary is very nearly in the line of sight, and hence the change is principally in distance. It is always a difficult pair to measure, and many of the observations are of uncertain value. For this reason the period and other elements of the orbit are not accurately known. The system has a proper motion of 0″115 in 287°2 (Auwers). 37 42

The following orbits have been found:

1871	Doberck	95.50 yrs.	*A. N.* 2123
1887	Celoria	85.27	*A. N.* 2904
1895	See	73.0	*Evolution of the Stellar Systems*
1903	Doberck	79.63	*A. N.* 4041

The following measures are sufficient to show the relation of the components during the last ten years:

1895.03	122°0	0″62	8*n*	Barnard
1895.36	117.9	0.58	3*n*	HΣ
1896.16	120.1	0.45	7*n*	Com
1897.43	120.1	0.44	4*n*	Lewis

1897.62	120°4	0″63	2*n*	Brown
1897.99	119.7	0.57	2*n*	Hu
1898.13	118.2	0.61	3*n*	A
1899.29	118.5	0.64	4*n*	A
1899.41	117.0	0.43	3*n*	Lewis
1899.93	115.4	0.75	9*n*	Doo
1900.42	116.1	0.48	3*n*	Bryant
1900.82	117.1	0.55	2*n*	Hu
1900.93	119.2	0.74	6*n*	A
1901.41	118.8	0.46	3*n*	Bryant
1902.95	112.3	0.64	5*n*	A
1903.36	111.9	0.66	3*n*	A
1903.45	118.7	0.67	3*n*	Biesbroeck
1903.45	115.1	0.74	10*n*	Doo

[Ma (430, 452) ... Ma (**IX, X, XI, XIII, XV**) ... Σ^1... H (**V**)... Ek (**I**)... Da^3... Da^4... Bp... Se... Se^2... Mh (*Sid. Mess.* Nov. 1846)... Se (1072, 1614)... Se (*Comp. Rend.* **XLVIII**, 375) (*Mon. Not.* **XXVI**, 63) .... Bond (*Am. Acad.* **II**, 144)... Mh... Wn (**V**)... Wn (1738) ... WJ^2... Hd... Ba (**II, IV**) ... En (1674, 2677, 2742, 2786)... Flm ... Du ... WS... Sk... Sk^2... Sk^3... Sk^4... Sk^5... OΣ (**IX, X**)... Δ (1192, 1474)... Δ (**I, II**)... Sp (2133)... Sp (**I, II, II** App.)... Do (*Observatory*, **II**, 171) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (2121, 2123, 2198, 2433, 3466, 3680, 3931).... Per.... Per (2529, 2685).... Kustner (2584).... Celoria (2904)... β^3... Hl (**I, II**)... See (*Beob. Berlin*, No. 6, 1892)... Sp (**III**) ... Big (*Bul. Ast.* **XII**, 299)... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)... Barnard (*A. J.* 447) ... Everett (*Mon. Not.* **LVI**, 464)... See (*A. J.* 349, 376, 378) (*Evolution of the Stellar Systems*)... Com (**X**)... Hu (*A. J.* 427)... Brown (3645)... Gl (*Mon. Not.* **LXI**, 556)... HΣ (**XII**)... Biesbroeck... A (3585, 3639) (*Bul. L. O.* No. 11) .... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**).... Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1077)

$38^m\ 11^s$ **7370.** **Hu 655.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

38 15 **7371.** **Σ 3095.** The angle in Σ appears to be too large. The later measures show no motion.

1869.36	337°5	2″84	5*n*	Δ
1878.45	337.8	2.83	2*n*	β
1879.41	335.8	2.96	4*n*	Cin
1880.51	339.4	2.87	2*n*	Pt
1897.68	335.8	2.83	3*n*	Doo
1902.40	335.5	3.04	3*n*	Hu
1903.31	336.5	2.81	3*n*	β

Glasenapp measures a faint pair in the field *sf.*:

1890.47	201°6	21″41	2*n*	Gla	9.7...10.4
1903.48	204.7	19.74	1*n*	β	10.0...10.6

[Ma (*F. S.* **I**) ... Δ (1573)... Δ (**II**)... Flm... β^1... Cin^5... Pt... Glasenapp (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)... β^6...]

38 21 **7372.** *a Serpentis.* **H 1277.** A still more distant faint star is given in Mu, 270°6 : 112″68 (1836.45) 1*n*. There is an error of 180° in the angle of the H companion. The proper motion of *a Serpentis* from meridian observations is 0″130 in 64°5 (Auwers). The two sets of measures of the companion in 1878 and 1903 give 0″136 in 67°1.

1830+	359°5	60″±	1*n*	H	3...14
1836.45	359.7	61.48	1*n*	Mu	
1878.82	353.8	58.78	2*n*	β	...12.0
1897.59	351.0	57.86	3*n*	Doo	...14.5
1903.32	350.6	58.09	3*n*	β	...10.9

[H (**V**)... Mu... Pk... β^1... β^3... Doolittle (*Pub. Flower Obsy.* **I**)... β^6...]

7374. **β 620.** (AC = **H** 4803.) The duplicity of the principal star of the wide pair, H 4803, was discovered with the 18½-inch. Change uncertain. Lacaille 6516. $38^m\ 54^s$

All the other measures of the close pair are given.

A and B

1892.41	154°4	0″50	3*n*	β
1892.41	165.5	0.65	1*n*	Lv
1896.49	170.2	0.72	1*n*	A
1896.52	174.5	0.63	3*n*	Lv
1901.15	163.0	0.67	3*n*	Doo

AB and C (= H 4803)

1878.38	214°1	50″25	1*n*	β	7.5... 9.0
1890.45	213.9	50.75	2*n*	Gla	7.1... 8.5
1891.95	214.3	50.77	6*n*	β	7.2... 8.8
1892.41	215.4	50.53	1*n*	Lv	...10.0
1901.15	214.4	50.69	3*n*	Doo	7.[illegible]... 9.2

[β (**X**)... β^1... β (3114, 3142) (*Pub. L. O.* **II**)... Lv (*A. J.* 278, 407) (*Proc. Haverford Coll. Obsy.* 1892)... Cin^5... A (3395)... Glasenapp (**I**)... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

7375. **Σ 1969.** Decided change in distance. The nature of the motion is uncertain. 39 1

1831.87	43°4	1″46	3*n*	Σ
1843.61	44.0	1.39	1*n*	Ma
1866.72	44.1	1.05	3*n*	Δ
1896.50	51.4	0.72	2*n*	Lv
1896.64	49.1	0.80	3*n*	A
1899.29	51.9	0.66	3*n*	A

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Cin^5... Lv (*A. J.* 407)... A (3395, 3639)... Brown (3645)...]

(See p. 1077)

7376. **Σ 1968.** Unchanged. 39 12

1867.65	94°0	14″04	3*n*	Δ
1905.41	93.8	14.14	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Cin^5... Glasenapp (**I**) ... β^6...]

7377. **A. G. 198.** Double in *A. G. Albany.* 39 22

1902.46	147°4	1″98	3*n*	Miller

[β^5... Miller (*A. J.* 554)...]

7378. **H 4804.** The measures are discordant in distance. 39 22

1879.25	283°2	19″39	1*n*	Cin	8.6...8.9
1890.39	284.1	18.39	2*n*	Gla	9.2...9.3
1904.39	284.1	19.15	2*n*	β	9.3...9.3

[Cin^5... Glasenapp (**I**)... β^6...]

7379. **H 572.** The only measure is this: 39 24

1903.31	276°4	22″35	2*n*	β^6	8.7...11.2

7380. **β 240.** Discovered with the 6-inch. By an error in the reduction, the distance in β^3 is printed 31″60. No sensible change. All the later measures are given: 39 32

A and B

1880.46	135°9	2″49	1*n*	β
1892.70	135.0	2.27	3*n*	Lv
1899.26	134.0	2.33	1*n*	β
1901.41	135.4	2.36	3*n*	Doo

A and C

1892.36	40°2	28″33	2*n*	Lv
1899.26	39.7	28.73	1*n*	β
1901.42	40.0	28.60	2*n*	Doo

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....β^{3} .... Δ (**I**) .... Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* **II**)...]

40^{m} 12^{s} **7381. Pritchett.** (= **Ku** 51.) From *Pub. Morrison Obsy.* I. Magnitudes not given.

1901.38	45°2	4″52	2*n*	β	9.0... 9.0
1901.46	224.9	4.70	2*n*	Ku	9.8...10.0

[Pt...Kustner (3821)...β^{5}...]

40 22 **7382. Σ 1980.** Probably without change.

1866.87	53°0	9″88	3*n*	Δ
1897.51	51.4	10.63	2*n*	Gla

[Ma (*F. S.* **I**)...Δ (**II**)...Cin^{5}...Glasenapp (**V**)...]

40 29 **7384. H 1278.** Nothing since Herschel but the following:

1890.47	127°7	27″71	1*n*	Gla	8.5...10.7

[Glasenapp (**I**)...]

40 30 **7385. H 4807.** "Small star extremely faint." Readily seen with the 6-inch, 1877. The later observations are:

1880.44	1°9	10″35	1*n*	Cin	8.0...11.0
1882.37	359.4	12±	1*n*	W	7.0...12.0
1904.39	5.0	10.88	2*n*	β	8.3...11.5

[Cin^{6}...Wilson (Cin^{10})...β^{6}...]

40 39 **7386.** β *Serpentis.* **Σ 1970.** (= Ħ **IV. 36.**) Fixed. The large star has a proper motion of 0″060 in 125°5 (Auwers).

1867.81	265°0	30″68	5*n*	Δ
1905.30	264.9	30.55	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XII, XIII, XV**) ... H (**VII**) ... OΣ (**IX**)...Δ (**II**)... Pk ....Per....En (2742)....Glasenapp (**I, V**)....*Annals Toulouse Obsy.* **III**.... β^{6}....]

40 43 **7387. Innes 90.** No measures of this.

[Innes (3406) (*Mon. Not.* **LVII**, 533)...]

41 3 **7388. Ho 396.** This star is not in SD.

1902.99	172°3	2″14	3*n*	Doo

[Ho (3234)...]

41 33 **7389. Σ 3096.** Without change.

1868.95	83°5	3″35	4*n*	Δ
1905.41	81.7	3.29	1*n*	β

[Ma (*F. S.* **I**)... Δ (**II**)...Cin^{5}...Glasenapp (**I**)...β^{6}...]

7390. Σ 1975 *rej.* From *Catalogus Novus.* Nothing since Struve but the following: 41^{m} 46^{s}

1904.70	51°2	18″93	2*n*	β^{6}	8.1...11.0

7391. Σ 1973. (= Ħ **N. 32** = **H 257** = **Sh 209.**) Fixed. 41 56

1866.71	322°6	30″66	4*n*	Δ
1895.42	320.9	30.46	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)...H (**II**)...Δ (**II**)... Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...]

7392. OΣ 301. Without change. The single measure of Ma (XIII) of 51°0 is probably a misprint for 31°0 42 8

1867.95	30°9	3″82	4*n*	Δ
1898.29	31.8	3.87	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**)... Glasenapp (**V**)... Hu (*Pub. L. O.* **V**)...]

7393. Hu 657. With a later measure the mean is: 42 16

1904.33	122°7	0″56	3*n*	Hu	8.5...8.5

[Hu (*Bul. L. O.* No. 57)...]

7394. Σ 1976. Without change. 42 33

1866.40	71°9	19″00	3*n*	Δ
1897.45	71.8	19.32	2*n*	Gla

[H^{1}... Ma (*F. S.* **I**) ... Ma (**XI**) ... Ra (**XXIII**)... Δ (**II**) ... Glasenapp (**V**) ... *Annals Toulouse Obsy.* **III**...]

7396. Σ 1974. Without change. 42 56

1867.50	162°2	2″46	3*n*	Δ
1890.41	163.3	2.72	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Mh... H (**VIII**) ... Se.. Wn (1738)... Δ (**II**)...LM ...Cin^{5}...Glasenapp (**I**)... Bryant (*Mon. Not.* **LX**, 506)... *Annals Toulouse Obsy.* **III**...]

7398. Σ 3126. Probably unchanged. Later observers make the following star the smallest. 43 49

The following are all the other measures:

1868.76	105°1	2″47	4*n*	Δ	9.6...9.7
1879.27	103.3	1.80	1*n*	Cin	8.9...9.3
1890.41	108.8	2±	2*n*	Gla	9.3...9.5
1903.18	104.0	2.16	2*n*	β	9.5...9.5

There is a 12.4 m star preceding:

1903.18	284°9	34″11	2*n*	β

[Δ (**II**)...Cin^{5}...Glasenapp (**I**)...β^{6}...]

7399. H 573. From H (V). 44 19

1900.44	66°3	14″14	2*n*	Espin (3717)

7400. Σ 3097. Fixed. 44 26

1867.49	181°6	3″78	3*n*	Δ
1879.33	182.4	3.96	3*n*	Cin

[Δ (**II**)...Cin^{5}...Glasenapp (**I**)...]

44^{m} 29^{s} **7401.** **Σ 1977.** Fixed.

1867.44	357°.4	13″.78	3*n*	Δ
1904.29	357.0	13.80	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^{5}...β^{6}...]

44 44 **7402.** **β 946.** **B. A. C. 5248.** Discovered with the 18½-inch. A fine unequal pair in *Draco.* In Heis 5 m; DM 6.0. Change in distance. The later measures are:

1891.28	148°.9	1″.43	3*n*	β
1902.40	147.9	1.64	5*n*	Doo
1905.38	150.3	1.84	3*n*	Doo

[β (**XIII**)...β^{3}...β (3114) (*Pub. L. O.* **II**) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

44 48 **7403.** **Ho 397.** "A star 13 m, 125°.5 . 41″.64."

AB	1904.51	87°.1	29″.88	3*n*	Doo
AC	1904.51	125.0	42.94	3*n*	Doo

[Ho (3234)...]

44 50 **7404.** **β 415.** Discovered with the 6-inch. The measures of AC indicate a proper motion of 0″.1 in one of the stars. There appears to be no change in AB.

A and B

1892.42	335°.4	12″.77	2*n*	Lv, C
1899.08	334.5	12.86	2*n*	β

A and C

1892.42	358°.3	29″.22	2*n*	Lv, C
1899.08	358.7	28.39	2*n*	β

[β (**VII**)...β (2103)...Δ (I)...Lv and Collins (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...]

45 22 **7407.** **Σ 1978.** Unchanged.

1843.43	234°.6	14″.86	2*n*	Ma
1866.80	234.9	15.12	3*n*	Δ
1895.42	234.8	15.71	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Glasenapp (**IV**)...*A. G. Leipzig*, p. 209...]

45 26 **7408.** **Σ 1979.** Without change.

1865.77	246°.0	9″.20	3*n*	Δ
1905.12	247.5	9.45	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^{5}...β^{6}...]

45 32 **7410.** **Skinner 9.** Discovered with the Washington Transit Circle.

1902.40	96°.0	2″.15	3*n*	Hu

[β^{5}...Boeger (*A. J.* 522)...Hu (*Bul. L. O.* No. 44)...]

7413. **Σ 1982.** No material change. 45^{m} 48^{s}

1868.09	300°.2	4″.72	4*n*	Δ
1870.83	302.7	4.75	3*n*	Du
1897.50	300.8	5.15	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XII, XIII, XV**)...Se...Se^{2}...Du...Δ (**II**)..Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**)...Espin (*Mon. Not.* **LXIV**, 676)...]

7414. **β 621.** Discovered with the 18½-inch. My single measure in 1877 was noted as somewhat uncertain, but there seems to be some change in the angle. 45 55

1878.48	75°.1	0″.5 ±	1*n*	β	7.5...8.0
1884.61	65.5	0.40	4*n*	HΣ	
1891.32	62.2	0.57	3*n*	β	8.1...9.3
1898.22	58.0	0.60	3*n*	Doo	8 ...8
1898.53	57.0	0.54	1*n*	Lewis	
1898.57	57.0	0.63	3*n*	A	7.5...8.5
1901.36	56.8	0.54	3*n*	Doo	8.0...8.8
1902.33	54.8	0.43	4*n*	Gr. Obsy.	
1905.41	54.0	0.60	3*n*	Doo	

[β (**X**)....β^{1}...β (3114) (*Pub. L. O.* **II**)...HΣ (**XII**)...A (3585)...Doolittle (*Pub. Flower Obsy.* I, **II**) (*A. J.* 547)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...]

7415. **Σ 1981** *rej.* Nothing since Struve but the following: 46 13

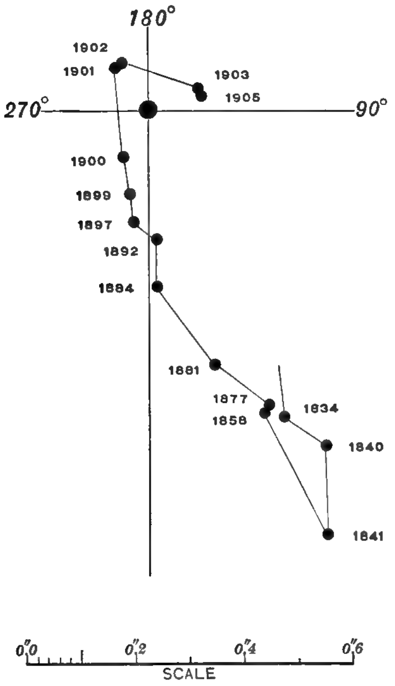
1905.29	5°.1	11″.90	1*n*	β^{6}	8.7...10.8

7416. *π^{2} Ursae Minoris.* **Σ 1989.** A binary in slow motion, and now single with all but the largest refractors. The early measures are discordant in distance, but probably cover the time of maximum separation of the components. But for the uncertainty of at least ten years in this time, which defines the extremity of the apparent ellipse, an approximate orbit could be found. The period will probably be more than one hundred years. 46 13

The following are all the measures since the discovery of this pair by Struve:

1832.68	24°.1	0″.71	3*n*	Σ
1836.76	23.9	0.53	3*n*	Σ
1840.95	28.1	0.70	3*n*	OΣ
1841.46	23.0	0.85	1*n*	Ma
1858.59	21.1	0.60	2*n*	Se
1877.61	22.6	0.59	1*n*	OΣ
1881.43	14.9	0.49	4*n*	β
1884.20	2.5	0.33	6*n*	En
1892.30	3.6	0.24	3*n*	β
1897.44	352.5	0.21	3*n*	A
1899.53	347.6	0.16	2*n*	A
1900.75	332.9	0.10 ±	1*n*	A
1901.53	219.5	0.10	1*n*	A
1902.66	209.8	0.10 ±	1*n*	A
1903.56	114.1	0.10 ±	1*n*	A
1905.57	106.4	0.10	1*n*	A

With reference to the later positions, Aitken states that the quadrant was indeterminate, and, owing to the extreme closeness of the components, the position-angles are necessarily somewhat approximate, although the elongation was well seen. All the observations were made with the 36-inch refractor with powers from 1900 to 3000.



π^2 Ursae Minoris. Σ 1989

[Ma (*F. S.* **I**)...Ma (**IX**)...OΣ (**IX, X**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)... Flm...En (2677)...β⁴...β (3142) (*Pub. L. O.* **II**)...β (*Ast. and A.-P.* **XI**, 548)...Lewis (*Observatory*, Aug. 1902). . A (3465, 3639) (*Bul. L. O.* No. 11) ...Glasenapp (**V**)...Biesbroeck...]

(See p. 1077)

46^m 24^s **7418.** 2 *Scorpii.* **β 36.** Discovered with the 6-inch. There has been no sensible relative change, but it is probably a physical system, as the components have the same proper motion of 0″049 in the direction of 253°6 (Auwers).

1879.42	277°2	2″69	2*n*	Cin	5.2... 7.7
1884.14	274.7	2.89	4*n*	W	5.7... 7.7
1888.57	277.1	2.63	1*n*	Lv	5.8... 7.6
1889.47	276.3	2.84	2*n*	T	5.5...10.2
1892.38	277.8	2.86	2*n*	Lv	5.8... 7.6
1894.58	276.6	1.94	2*n*	Sellors	6 ... 9.5
1896.32	279.7	2.83	3*n*	Tebbutt	4.5... 7
1897.47	274.4	2.93	1*n*	See	5.9... 9
1898.49	275.5	2.88	3*n*	Scott	5 ... 9

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Cin⁴...Cin⁵...Cin⁶...Wilson (Cin¹⁰)... Lv¹....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)....T (3186).... Sellors (3303)....Tebbutt (*Mon. Not.* **LVII**, 584; **LXIV**, 67)....See (3496).... Scott (*Mon. Not.* **LIX**, 427)...]

46 36 **7419.** **Ho 398.** No change.

1902.34	36°9	8″94	3*n*	Doo

[Ho (3234)...]

7421. **β 810.** Discovered with the 15½-inch at the Washburn Observatory. The motion, if any, is slow. 46^m 55^s

1888.51	91°5	1″35	3*n*	Com
1893.37	89.1	1.15	3*n*	Wilson
1896.51	86.0	0.82	3*n*	Lv
1898.61	89.4	0.99	3*n*	A
1899.41	85.3	0.92	2*n*	Brown
1901.46	87.9	1.13	4*n*	Doo
1901.99	90.2	1.08	2*n*	Lewis

[β (**XII**)...β⁴...Com (**VI**)...Lv (*A. J.* 407)...Wilson (   )...A (3585)...Brown (3645).... Doolittle (*Pub. Flower Obsy.* **II**).... Lewis (*Mon. Not.* **LXI**, 486; **LXIV**, 801)...]

7422. **Σ 1983.** Change in angle and distance. The following are all the measures: 47 27

1830.60	77°0	17″44	3*n*	Σ
1845.55	76.8	16.58	1*n*	Ma
1867.88	73.1	16.31	3*n*	Δ
1879.37	73.1	16.23	1*n*	Cin
1880.49	73.8	16.56	1*n*	Big
1904.34	72.2	15.80	2*n*	β

[Ma (*F. S.* **I**)...Flm...Δ (1800)...Δ (**II**)...Cin⁵...Big...β⁶...]

7424. **Hu 747.** With two later measures the mean is: 47 34

1904.43	114°4	2″45	3*n*	Hu	9.0...12.5

[Hu (*Bul. L. O.* No. 65)...]

7425. **Σ 3099.** Probably fixed. 47 55

1867.50	116°7	2″35	2*n*	Δ
1879.45	113.9	2.20	4*n*	Cin
1890.48	106.3	2±	2*n*	Gla
1900.48	114.3	2.29	2*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...Cin⁵...Glasenapp (**I**)...]

7428. **Σ 1984.** Without change. Erroneously called Σ 1924 in Ma (XV). The principal star is given a proper motion of 0″090 in 270° (*A. G. Harvard*). 48 1

1867.65	275°2	6″46	4*n*	Δ
1903.31	276.8	6.44	2*n*	Do
1905.48	276.0	6.69	3*n*	Doo

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...H¹...Se...Se²...Du...Flm...Δ (**II**)... Per...Sk³...Big...Seagrave (*Sid. Mess.* **II**, 22, 274)...Maw (**II**)...Glasenapp (**V**)....Espin (*Mon. Not.* **LXII**, 529)...Do (3931)...]

7429. **H 1280.** H (V) 352°6 : 25″±, and R. A. 1^m less, but the first place is correct. 48 43

7429½. **A. G. 199.** No other measures. 48 47

[Espin (3717)...]

7430. **Σ 3100.** No motion. 49 2

1868.48	247°0	5″81	4*n*	Δ
1905.22	247.2	5.59	1*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin⁵...β⁶...]

$49^m\ 29^s$ **7431.** *ρ Scorpii.* **See 251.** Other measures are:

1899.35	97°0	38″33	3*n*	Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 505)...]

49 42 **7433. Σ 1985.** (= **Ħ II. 85 = Sh 211.**) The angle appears to be slowly increasing, the distance remaining sensibly constant. The principal star has a proper motion of 0″140 in 245°2 (Kustner), and the companion is moving with it.

1783.32	316°1	....	1*n*	Ħ
1842.45	326.6	5″99	4*n*	Ma
1858.42	330.1	5.61	3*n*	Wr
1861.44	330.0	5.70	2*n*	OΣ
1866.76	330.6	5.72	3*n*	Δ
1871.12	331.1	5.66	6*n*	Du
1878.76	332.8	5.95	4*n*	Sp
1885.41	334.0	5.91	2*n*	Per
1887.43	334.3	5.82	4*n*	Hl
1896.47	336.6	5.79	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)... Ma (**X, XI, XIII**)... H^1... Mh... K...Wr...Se... Se^2...Ra (**XXIV**)...Ba (**II**)...Du...OΣ (**IX**)...En (1674)...Δ (*Mem. Accad. Sci.*)...Δ (1032, 1114)...Δ (**I, II**)...WS^2...Sk...Sp (**II**)...Per...Per (2748) ...Flm...Pt...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (3023)...Cin^4 ... Cin^5... Hayn (3051) ... Lv^1... Jones (*A. J.* 312)... Hl (**II**) ... Glasenapp (**I**)... Maw (**II**)... Searle (*A. J.* 299) ... Hu (*A. J.* 397) ... *Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Sk^5...Giacomelli (**III**)...]

49 46 **7434. Σ 1986.** Fixed.

1866.71	93°9	14″49	3*n*	Δ
1898.40	93.2	14.76	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**I, V**)...*A. G. Leipzig*.p. 209... *Annals Toulouse Obsy.* **III**...]

50 13 **7436. Hu 658.** With one later measure the mean is:

1904.33	340°3	2″40	3*n*	Hu

[Hu (*Bul. L. O.* No. 57)...]

50 17 **7437. H 1281.** "Caught in a glimpse. The small star requires the most cautious illumination, and turning the eye aside." I could not see the companion with the 6-inch on two occasions in 1875. The only measures are:

1890.36	229°8	35″12	1*n*	β	6.5...12.0
1901.29	231.1	34.40	2*n*	β	7.1...11.0

[β (3048)(*Pub. L. O.* **II**)...β^5...]

50 22 **7438. OΣ 302.** (= **H 576.**) Unchanged.

1868.66	51°5	28″67	4*n*	Δ
1898.34	51.7	28.68	4*n*	Hu

[Ma (**XI, XIII**)... OΣ (**XI**)... Δ (**I**)... Per^1... Per (2685) ... Glasenapp (**V**)... Hu (*Pub. L. O.* **V**)...]

50 35 **7439. Ho 399.** The only other measure is:

1902.34	118°1	2″78	3*n*	Doo

[Ho (3234)...]

7440. Σ 1988. Perhaps a little change in the angle. $51^m\ 8^s$

1866.86	264°1	2″75	3*n*	Δ
1887.48	261.8	2.70	3*n*	Hl
1903.35	260.7	2.58	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^2...Ra (**XXV**)...Flm...Du...WS...Δ (**I, II**) ...Δ (1209)...Sp (**II**)...Big...Per...Per (2748)...Hl (**II**)...Glasenapp (**I, III**) ...Big (*Bul. Ast.* **XII**, 299)...Knorre (3300)...Ebell (3321)...*A. G. Leipzig*, p. 209...*Annals Toulouse Obsy.* **III**...Do (3931)...]

7441. Σ 1987. (= **Ħ III. 103 = Sh 212.**) Fixed. 51 15

1867.46	323°1	10″39	4*n*	Δ
1890.38	322.4	10.24	5*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Ra (**XXII**)...Δ (1125)...Δ (**I, II**)...T (2898)... Giacomelli (**III**)...Glasenapp (**I**)...]

7442. λ *Coronae Borealis.* **Ħ VI. 94.** (= σ **499.**) The principal star has a proper motion of 0″091 in 23°4 (Auwers). The only other measures are: 51 25

1879.29	64°3	98″34	1*n*	β^8	5.0...9.5
1904.38	64.5	97.16	2*n*	β^6	

7443. H 2798. "A third, 10–11 m, near." C is DM (17°) 2936. 51 35

AB	1873.50	30°4	8″45	1*n*	Δ	11.0...11.5
AC	1873.50	351.3	58.49	1*n*	Δ	... 9.0

[Δ (**I**, p. 363)...]

7444. π *Scorpii.* **β 622.** Distant companion noted with the 18½-inch. The large star has a proper motion of 0″056 in the direction of 234°3 (Auwers). B is probably only an optical companion. 51 36

1892.39	132°2	50″41	3*n*	β
1899.44	132.2	50.21	1*n*	β
1901.41	131.9	50.47	2*n*	Doo

[β (**X**)...β^1...β (3142)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **II**) ...]

7448. Σ 1997 *rej.* Nothing but this since Struve: 52 10:

1905.29	343°9	19″25	1*n*	β^6	8.5...10.8

7449. Sh 213. (= σ **498.**) The companion is SD (19°) 4274. Probably fixed. 52 10

1880.38	319°0	17″83	4*n*	Cin
1905.25	319.0	17.75	2*n*	β

[H (**VIII**)...Cin^5...Cin^6...Wilson (Cin^{10})...β^6...]

7450. H 577. "Elegant star." The following are all the measures: 52 21

1873.41	15°4	9″26	1*n*	Δ	8.5...9.0
1896.60	15.5	9.29	2*n*	Eichelberger	

[Δ (**I**, p. 358)...Eichelberger (*A. J.* 397)...]

$52^m 26^s$ **7451.** **H 258.** The following is the only measure:

1873.50	255°.8	16′.17	1*n*	Δ	9.5...10.5

[Δ (I, p. 357)...]

52 37 **7453.** ε *Coronae Borealis.* **A. G. Clark 7.** Discovered by Alvan G. Clark with the Washington 26-inch. The principal star has a proper motion of 0′.117 in 237°.9 (Auwers), and the companion evidently has the same movement.

The other measures are:

1879.14	357°.8	1′.91	4*n*	β	...12.2
1881.47	360.1	2.24	2*n*	β	...10.8
1888.36	350.7	1.95	4*n*	HΣ	...13
1895.67	349.8	1.96	2*n*	Bar	
1903.37	359.8	1.87	2*n*	β	...11.0
1905.36	351.9	2.00	1*n*	A	

[Hl (2147)...Hl (I)...β1...β3...β4...β (*Am. Jour. Sci.* April, 1879)...Barnard (*A. J.* 447)...HΣ (**XII**)...β6...]

52 39 **7454.** **Σ 3101.** There has been no sensible change in the components, but they have a common proper motion of 0′.300 in the direction of 287°.5 (Porter), and therefore probably form a physical system.

1859.49	59°.8	2′.05	1*n*	Se
1868.20	62.1	2.10	4*n*	Δ
1879.29	58.7	2.24	2*n*	Cin
1890.39	66.0	2.72	2*n*	Gla
1899.45	62.3	2.13	2*n*	A

[Ma (*F. S.* **I**)...Se...Δ (**II**)...Cin5...Glasenapp (I)...A (3639)...]

52 54 **7456.** **H 1283.** Place from *Harvard Zones*, where it is noted "double."

52 55 **7457.** **See 255.** Later measures are:

AB	1899.46	21°.3	12′.11	2*n*	Cg
AC	1899.46	343.0	15.02	2*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

53 9 **7458.** **Hn 125.** No other measures.

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

53 21 **7459.** **Σ 1991.** Change doubtful.

1869.67	198°.0	3′.00	4*n*	Δ
1871.25	199.5	3.17	3*n*	Du
1881.45	198.1	3.24	2*n*	Big
1888.64	196.9	3.20	2*n*	HΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Se...Se2...Flm...Du...Δ (**II**)...Big...HΣ(**XII**)...]

53 26 **7460.** **Σ 1996.** Without change.

1868.72	109°.6	19′.23	3*n*	Δ
1879.31	109.5	19.55	1*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...]

7461. **Σ 1990.** (= **H I. 81** = **S 675.**) A, B, and C of $53^m 43^s$ Σ are respectively C, B, and A of H. There is some confusion in the letters used by modern observers, arising probably from Struve giving the angle of CB instead of BC.

A and B

1867.94	59°.7	56′.39	2*n*	Δ
1885.42	59.2	56.36	2*n*	Per
1897.50	59.8	56.60	2*n*	Gla

C and B

1868.03	208°.4	3′.79	4*n*	Δ
1885.42	207.3	4.05	3*n*	Per
1897.50	207.3	3.75	2*n*	Gla

A and C

1866.86	57°.2	59′.93	3*n*	Δ
1897.50	57.9	60.20	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H1...Du...Δ (**II**)...Per...Per (2748)...Glasenapp (**V**)...Knorre (3632)...*Annals Toulouse Obsy.* **III**...]

7462. **Hn 126.** No later measures. 53 45

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

7463. **See 257.** Later measures give: 53 49

1899.19	340°.6	6′.26	3*n*	Cg
1902.38	341.7	6.39	3*n*	Doo

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7465. **See 260.** Later measures are: 54 20

1899.44	23°.1	5′.96	3*n*	Cg
1902.42	24.2	6.13	3*n*	Doo

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7466. **Σ 1993.** (= **H V. 126** = **Sh 214.**) There is a very 54 22 decided change in the distance from proper motion. As the angle remains constant, the components will form finally a close pair. The measures give an annual movement of about 0′.076 in the direction of 38°.

1783.60	37°.9	37′.88	1*n*	H
1823.45	36.6	34.92	2*n*	Sh
1831.76	37.7	33.96	3*n*	Σ
1840.79	38.0	33.39	3*n*	OΣ
1865.43	37.9	31.53	5*n*	Δ
1875.47	38.2	30.51	1*n*	OΣ
1884.51	39.0	30.00	5*n*	En
1885.44	38.6	29.98	4*n*	Per
1888.50	38.7	29.73	3*n*	HΣ
1895.42	38.5	29.28	2*n*	Gla
1897.82	38.7	29.20	6*n*	Doo
1903.35	38.9	28.61	2*n*	Do
1905.16	38.8	28.35	2*n*	β

[Ma (*F. S.* **II**)...H1...H (**V**)...OΣ (**IX**) (**X**, pp. 31, 174)...Δ (1572)...Δ (**II**)...Flm...Sk3...Pt...Per...Per (2748)...En (2742)...Glasenapp (**IV**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3931)...β6...]

$54^m\ 25^s$ **7467.** See 261. Discovered by Cogshall.

1900.44	13°.6	10″.33	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

54 31: **7469.** Σ 1994 *rej.* This is a faint pair in the field with Σ 1993; and is the 9.0 m star, DM (17°) 2945. It is not in *A. G. Berlin.* The star there called by this DM number is one of the components of Σ 1993. Σ 1994 *rej.* is nearly 5′ distant from Σ 1993.

1905.12	339°.0	21″.50	1*n*	β^6	9.3...10.5

54 36 **7470.** **H** 4826. "Neat star." Only this later:

1880.42	247°.9	5″.02	2*n*	Cin^6	9.0...9.8

54 36 **7471.** **Σ** 1992. Change is uncertain. The observations before Struve are obviously unreliable.

The following are all the measures:

1828.48	330°.0	3″.5	1*n*	H
1830.27	328.9	6.85	1*n*	H
1831.53	329.9	5.71	3*n*	Σ
1843.34	328.6	5.63	1*n*	Ma
1856.42	326.8	5.99	2*n*	Se
1865.93	327.7	5.86	1*n*	Se
1867.45	325.4	5.74	3*n*	Δ
1888.15	324.8	5.95	3*n*	HΣ
1896.47	325.8	5.89	3*n*	Lv
1896.53	325.0	5.60	2*n*	Soulé
1897.37	324.4	6.17	3*n*	Doo
1898.40	326.7	5.93	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... H^1... Se... Se^2... Δ (**II**)... Lv (*A. J.* 407)... HΣ (**XII**)... Soulé (*A. J.* 410)... Glasenapp (**V**)... *A. G. Leipzig*, p. 209... Doolittle (*Pub. Flower Obsy.* **I**)...]

54 51 **7472.** **β** 623. Discovered with the 18½-inch. No material change.

1878.68	236°.8	0″.99	3*n*	Cin
1888.27	237.8	1.01	1*n*	Lv
1900.27	235.7	1.12	4*n*	Doo
1900.54	236.2	0.99	3*n*	A
1905.16	235.6	0.94	3*n*	Doo

[β (**X**)... β^1... Cin^5... Lv^1... Glasenapp (**I**)... A (*Bul. L. O.* No. 11)... Doolittle (*Pub. Flower Obsy.* **I, II**)... Biesbroeck...]

54 54 **7473.** **Ho** 400. A later measure is:

1903.37	132°.8	10″.32	3*n*	Doo

[Ho (3234)...]

54 54 **7474.** **Σ** 1995. Without change.

1866.72	311°.5	15″.77	3*n*	Δ
1902.41	312.2	15.52	2*n*	Ku

[Ma (**XI, XV**).... Ma (*F. S.* **I**).... Δ (**II**).... *A. G. Leipzig*, p. 209.... Kustner (3821)...]

55 3 **7475.** **Hu** 659. With a later measure, the mean is:

1904.33	244°.2	0″.41	3*n*	Hu	8.8...11.0

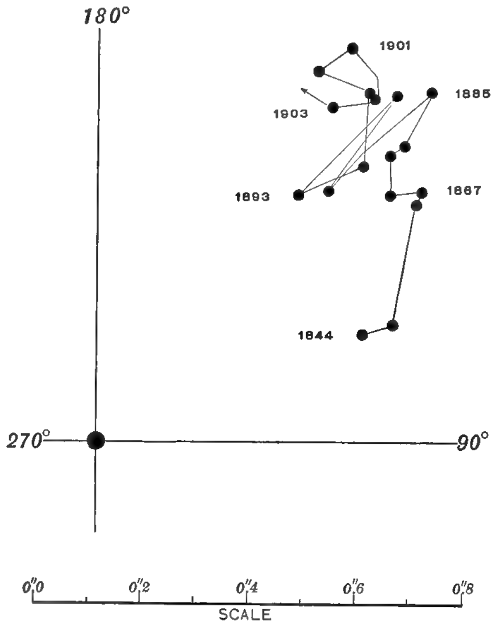
[Hu (*Bul. L. O.* No. 57)...]

$55^m\ 15^s$ **7476.** **β** 37. Discovered with the 6-inch. No motion.

1891.49	44°.6	2″.69	3*n*	β	9.0... 9.4
1892.41	43.4	3.09	3*n*	Lv	8.6... 9.7
1900.27	43.3	2.89	3*n*	Doo	8.8...10.2
1903.47	43.5	2.77	2*n*	A	

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1893)... Doolittle (*Pub. Flower Obsy.* **I**)...]

55 18 **7477.** **OΣ** 303. Slow direct motion in angle. The best of the measures are inconsistent in both angle and distance, and indicate nothing as to the character of the relative motion.



OΣ 303

1844.38	111°.8	0″.54	4*n*	Ma
1846.78	111.4	0.60	3*n*	OΣ
1865.44	126.6	0.75	2*n*	OΣ
1867.20	127.5	0.77	4*n*	Δ
1873.28	130.1	0.72	4*n*	Δ
1875.45	134.4	0.77	1*n*	OΣ
1881.99	134.0	0.80	6*n*	Hl
1885.41	136.9	0.91	2*n*	Per
1887.47	137.4	0.64	5*n*	Sp
1889.67	139.3	0.86	4*n*	HΣ
1893.46	140.8	0.60	1*n*	Ho
1895.44	136.2	0.72	2*n*	Gla
1898.29	144.3	0.88	3*n*	Hu
1898.96	140.0	0.78	6*n*	Bowyer
1901.44	145.8	0.77	3*n*	Gr. Obsy.
1901.56	148.9	1.00	3*n*	Doo
1902.46	141.2	0.83	6*n*	Gr. Obsy.
1903.39	149.4	0.81	2*n*	Do
1903.40	144.2	0.80	2*n*	Bowyer
1903.46	146.8	0.70	2*n*	Biesbroeck

[Ma (**XI**)....Se....OΣ (**IX**)....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Do (2307, 2330, 3023, 3680, 3931)... Pl.. Flm... Sk^3... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)... Per... Per (2749)... Sp (2133)... Sp (**II, II** App)... Δ (**I**)... En (2742)... Callandreau (*Bul. Ast.* **XII**, 523)...T (2866)... Maw (**I, III, IV**) Ho (3234)... Big (*Bul. Ast.* **XII**, 299)... Glasenapp (**IV**)... Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Brown (3645)... Hu (*Pub. L. O.* **V**)... HΣ (**XII**).. Biesbroeck ..Doolittle (*Pub. Flower Obsy.* **II**)...Lohse (*Pub. Potsdam Obsy.*)...]

$55^m\ 39^s$ **7478.** **β 38.** Discovered with the 6-inch. Unchanged.

1880.48	351°.5	4″.07	1*n*	Cin	8.5...10.0
1891.49	352.9	4.52	3*n*	β	7.7... 9.2
1901.69	350.2	4.72	4*n*	Doo	
1903.47	349.6	4.30	2*n*	A	

[β (I)... β (*Mon. Not.* **XXXIII**, 351) ... β (3114)(*Pub. L. O.* **II**)... Cin⁴... Cin⁶ ...Doolittle (*Pub. Flower Obsy.* **II**)...]

$56\ \ 5$ **7479.** **H V. 75.** (= σ 502.) Change from proper motion. Near the place of the variable, *T Coronae.*

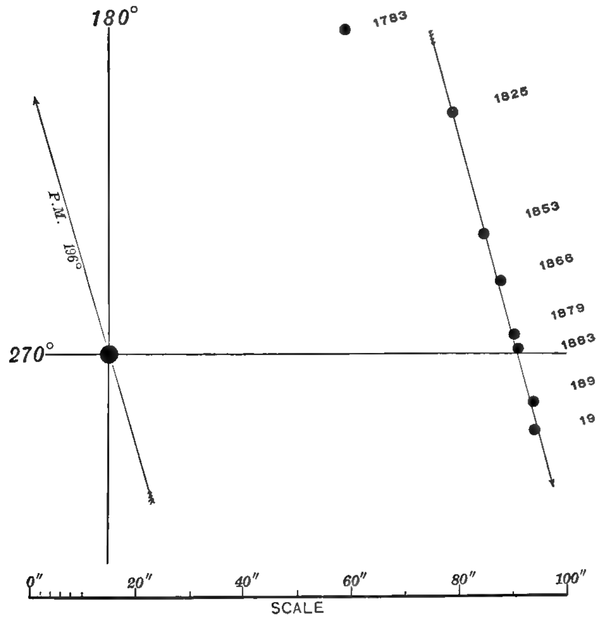
1841.42	108°.1	42″.42	1*n*	OΣ	7.0...10.0
1881.37	110.4	45.30	1*n*	OΣ	
1896.49	111.0	47.33	2*n*	Lv	
1897.38	109.9	46.87	3*n*	Doo	

[OΣ (**X**, p. 31)...Stone (*Mon. Not.* **XXVII**, 8)...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1077)

$56\ \ 28$ **7480.** ρ *Coronae Borealis.* **S 676.** (= **H VI. 93** = σ 503.) The principal star has a large proper motion:

Auwers	0″.815 in 196°.0
Porter	0.810 in 196.1
Measures, 1853–1903	0.795 in 194.8



ρ Coronae. S 676

The last value is from the five sets of measures by OΣ, HΣ, Lv, and β.

The following are all the measures:

1783.27	144°.4	87″.53	1*n*	H	
1825.48	125.1	79.19	3*n*	S	
1853.83	108.8	74.23	3*n*	OΣ	4.7...9.7
1866.66	100.8	74.76	1*n*	OΣ	
1879.39	92.8	75.99	1*n*	Cin	6.0...8.5
1883.47	90.9	76.61	3*n*	HΣ	
1896.49	83.7	79.99	3*n*	Lv	6.0...9.2
1903.20	80.0	81.29	3*n*	β	...9.6

[OΣ (**X**)...Cin⁵...Lv (*A. J.* 407)...β⁶...]

7482. **OΣ 304.** (= **H** 1285.) Unchanged. H called the small star 18 m. $56^m\ 40^s$

1866.56	175°.0	10″.71	3*n*	Δ
1898.31	173.7	10.73	3*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)...Δ (**I**)... Glasenapp (**IV**)... Hu (*Pub. L. O.* **V**)...]

7483. **A. G. 200.** Double in *A. G. Lund.* Measures by β⁶. $56\ \ 56$

7484. **Σ 2001.** Fixed. $57\ \ 10$

1868.02	169°.4	11″.47	4*n*	Δ
1878.29	168.8	11.93	1*n*	β
1902.36	169.6	11.96	1*n*	Hu

[Ma (*F. S.* **I**)...Δ (**II**)...β¹...Cin⁵...]

7486. **Σ 2000.** Fixed. $57\ \ 28$

1867.47	229°.4	2″.58	4*n*	Δ
1895.42	229.3	2.74	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Ma (324)...Se...Δ (**II**)...Glasenapp (**IV**)...]

7487. ξ *Scorpii.* **Σ 1998.** (= **H I. 33** = **H II. 20** = Sh 216.) A most interesting triple system. It was discovered by Sir William Herschel, and since that time the companion has made about two and one-half revolutions around the primary. The first observations of H and Σ were made when the components were separated nearly the maximum distance. For fifty years all the computers who investigated the orbit, with a single exception, placed all the observed positions subsequent to 1856 in the wrong quadrants. Thiele in 1856 gave the correct position of the apparent orbit, and found an approximate period of 49 years. The later investigators down to 1895 all placed the companion in the second and third quadrants during the forty years preceding the last named date, and this was assumed to be the correct distribution of the observed positions until a more careful investigation was made by Aitken in 1904, when it appeared beyond all question that the companion had never been seen or measured by any observer except in the first and fourth quadrants, and that the period could not differ much from 44 years. The system has a proper motion of 0″.097 in 258°.8 (Auwers). $57\ \ 46$

The following orbits have been found from measures ending with the respective dates in the first column:

1846	Madler	105.52 yrs.	*Fixstern-System* I, 256
1856	Thiele	49.05	*A. N.* 1199
1875	Flammarion	98.00	*Quar. Jour. Sci.* Jan. 1876
1876	Doberck	95.90	*A. N.* 2121
1887	Schorr	105.19	*Dissertation*, Munich, 1889
1895	See	104.0	*Evolution of the Stellar Systems*
1904	Aitken	44.5	*Bul. L. O.* No. 80

The following fifty selected positions are shown on the diagram:

A and B

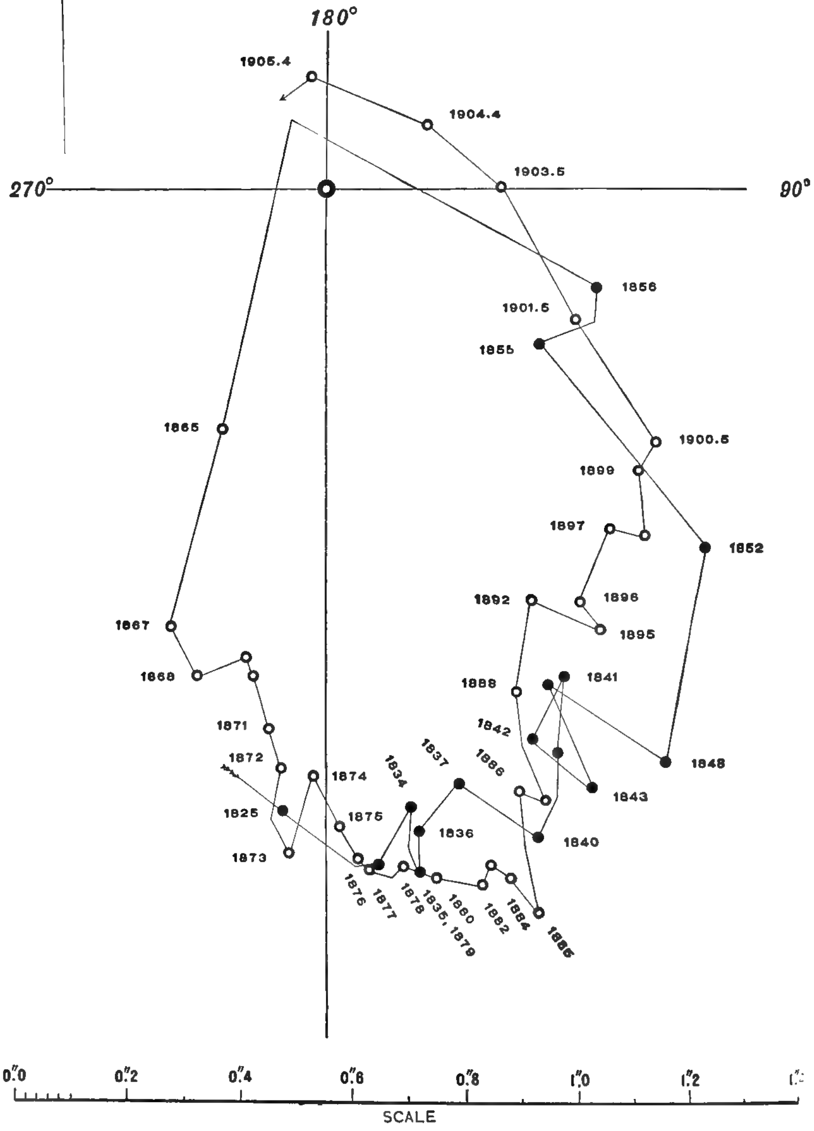
1825.47	356°.0	1″.15	3*n*	Σ
1832.46	4.4	1.21	3*n*	Σ
1834.50	7.8	1.17	8*n*	Da
1835.00	7.7	1.23	2*n*	Σ
1836.49	8.1	1.16	4*n*	Σ

1837.51	12°5	1″09	2*n*	Σ
1840.18	17.9	1.22	5*n*	Da
1840.57	22.2	1.09	1*n*	OΣ
1841.57	25.9	0.97	1*n*	OΣ
1842.42	20.4	1.05	2*n*	Ma
1843.90	23.8	1.17	7*n*	Ma
1846.47	24.0	0.97	8*n*	Mh
1848.54	30.5	1.19	3*n*	Da
1852.98	46.5	0.93	3*n*	J
1855.55	53.6	0.47	3*n*	Se
1856.58	69.7	0.51	1*n*	OΣ
1865.54	336.9	0.57±	2*n*	Da
1867.45	340.7	0.83	4*n*	Δ
1868.40	345.1	0.90	4*n*	Δ
1869.51	352.5	0.83	6*n*	Du
1869.52	348.2	0.88	5*n*	Δ
1870.39	349.8	0.89	5*n*	Δ
1870.54	353.3	0.88	2*n*	Du
1871.41	353.1	1.06	5*n*	Δ
1871.60	354.8	0.88	5*n*	Du
1872.46	353.8	1.12	5*n*	Δ
1872.53	357.4	0.96	3*n*	Du
1873.43	356.8	1.19	3*n*	Δ
1874.49	358.7	1.05	5*n*	Δ
1875.44	0.5	1.10	5*n*	Δ
1875.51	2.0	1.18	4*n*	Sp
1876.45	1.8	1.21	6*n*	Δ
1876.52	3.6	1.18	3*n*	Sp
1877.43	3.3	1.20	5*n*	Δ
1877.55	4.0	1.25	9*n*	Sp
1878.03	6.8	1.12	6*n*	Hl
1878.46	6.2	1.22	4*n*	Δ
1878.54	6.1	1.31	6*n*	Sp
1879.50	8.5	1.17	1*n*	β
1879.56	6.8	1.29	7*n*	Sp
1880.54	9.0	1.24	6*n*	Sp
1882.54	11.8	1.31	5*n*	Sp
1882.88	13.2	1.22	5*n*	Hl
1883.55	13.5	1.24	12*n*	Sp
1884.50	14.6	1.28	5*n*	Hl
1884.54	15.0	1.26	9*n*	Sp
1885.53	16.2	1.34	8*n*	Sp
1886.55	17.2	1.19	3*n*	Sp
1886.57	18.0	1.07	3*n*	Hl
1887.54	19.6	1.16	9*n*	Sp
1888.56	20.6	0.96	2*n*	Hl
1892.58	26.5	0.82	4*n*	Com
1895.31	30.3	1.04	3*n*	See
1895.53	33.4	0.81	3*n*	Com
1896.48	35.4	0.98	5*n*	Hu
1896.65	37.6	0.75	2*n*	Com
1897.59	39.8	0.79	2*n*	Brown
1898.17	42.6	0.84	3*n*	A
1899.35	48.4	0.70	3*n*	A
1899.42	47.2	0.81	6*n*	Doo
1900.54	52.3	0.74	5*n*	Doo
1901.47	62.2	0.50	3*n*	A
1903.55	90.5	0.31	3*n*	A
1904.40	123.2	0.21	2*n*	A
1905.38	187.8	0.20	4*n*	A

The third star, C, is a member of the system, and has a very slow retrograde motion about the close pair. As a triple system *ξ Scorpii* is very much like *ζ Cancri*.

AB and C

1828.47	77°6	6″73	7*n*	Σ
1836.34	75.1	7.13	7*n*	Σ
1852.22	74.6	6.99	1*n*	Σ
1864.38	70.6	7.15	12*n*	Δ
1868.89	69.9	7.07	9*n*	Δ
1874.95	69.0	7.11	6*n*	Δ
1883.34	65.9	7.28	7*n*	Hl
1894.89	65.9	7.22	9*n*	Com
1896.47	63.2	7.45	3*n*	Hu
1903.50	63.2	7.34	6*n*	Jouffray



ξ Scorpii. Σ 1998

[Ma (*F. S.* **I**, 256)….Ma (303, 324)…Ma (**IX, X, XI**)…Σ^1…BM (280)…H^1…H^2…H (**VIII**)…Mh…Mh (*Sid. Mess.* Sept. 1846)…Da^1…Da^2…Da^3…Da^4…Thiele (1199)…K…K (1519)…J^2…J^3…WJ^2…P1…J (*Mon. Not.* **XVIII**, 317)…Wn (**V**)…Wn (1738)…Ra (**XXI**)…Se…Se^2…Se^3…Se (1017, 1072, 1614) (*Mon. Not.* **XXVI**, 63)…Hd…Ba (**III, IV**)…Kn…WS…WS^2…Gl…Pl…Sk…Sk^2…Sk^3…Sk^4…OΣ (IX)…Δ (*Mem. Accad. Sci.*)…Δ (1032, 1114, 1474, 1572, 1735, 1799, 1886, 1979, 2080, 2193)…Δ (**I, II**)…

Flm .... Flm (*Quarterly Jour. Sci.* Jan. 1876) .... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) (*Observatory* **II**, 172) ... Do (2107, 2121, 2198, 2433, 3023, 3680, 3931) ... Sp (2133) ... Sp (I, **II**, **II** App.) ... Nobile (*Rend. della R. Accad. Sci.* Napoli, Dec. 1877) .... Ferr.... Du.... En (1518, 1674, 2677, 2742, 2786) .... Hl (*Wash. Obsns.* 1880, 1882, 1883–84, 1886) ... Hl (I, **II**) (*A. J.* 302) ... Je (2351) ... Pt ... Kustner (2584) ... Per ... Per (2529, 2685) ... β 2 ... β 3 ... β (*Mon. Not.* **LI**, 391) .... Cin 3 .... Cin 4 .... Cin 5 .... Cin 6 .... Lv 1 .... Wilson (Cin 10) .... T (2866) ... Collins (*Proc. Haverford Coll. Obsy.* 1891) ... Jones (*A. J.* 312 ... See (*Beob. Berlin* No. 6, 1892) ... Schorr (*Untersuchungen*, etc., *Sternsystem ξ Scorpii*, München, 1889) .... Glasenapp (I, **III**) .... Scott (*Brit. Ast. Ass'n* **V**, 75) (*Mon. Not.* **LIX**, 427; **LXIV**, 52) ... Sp (**III**) ... Maw (**II**, **III**) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... Giacomelli (**III**) ... Everett (*Mon. Not.* **LVI**, 464) ... Com (**X**) ... Schwarzschild (3335) ... Lv (*A. J.* 382) ... Hu (*A. J.* 397) ... Pritchett (*A. J.* 397) ... Wagner (*A. J.* 410) ... Solá (3529) ... Brown (3645) ... Coleman (*Mem. R. A. S.* **LIII**) .... *Annals Toulouse Obsy.* **III** .... Jouffray (*Bul. Ast.* **XXI**, 299) .... Biesbroeck .... Salet (*Bul. Ast.* **XXII**, 108) .... See (*A. J.* 349, 378) (*Evolution of the Stellar Systems*) .... A (3585, 3639) (*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XVII**, 111) (*Bul. L. O.* No. 80) ... Doolittle (*A. J.* 416) (*Pub. Flower Obsy.* **I**) ... Lohse (*Pub. Potsdam Obsy.*) ...]

(See p. 1077)

57m 50s **7488.** **Σ 1999.** (= **Ħ II. 21** = **Ħ N. 4** = **Sh 215.**) Near *ξ Scorpii.* Perhaps a little increase in the distance. Dembowski measures A of this pair and AB of Σ 1998, 169°.1: 280″.78 (1866.55) 7*n*.

1866.04	102°.1	10″.52	3*n*	Δ
1878.57	101.4	10.87	6*n*	Sp
1890.39	101.4	11.04	4*n*	Giacomelli
1896.48	100.7	11.10	3*n*	Hu

[Ma (*F. S.* I) ... Ma (**X**, **XI**) ... H 1 ... H (**VIII**) ... Mh ... J 2 ... P 1 ... Hd ... Ra (**XXIV**) ... Se ... Se 3 ... Se (1017) ... Du ... Kn ... Hl (*Wash. Obsns.* 1863) ... Δ (1125, 1572) .... Δ (I, **II**) .... Cin 5 .... Sp (**II**) .... Per .... Per (2529, 2685) .... Giacomelli (**III**) ... Collins (*Proc. Haverford Coll. Obsy.* 1891) ... Glasenapp (I) .... Hu (*A. J.* 397) .... Knorre (3518) .... *Annals Toulouse Obsy.* **III** .... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

58 0 **7489.** **Σ 2003.** No material change.

1866.09	171°.4	14″.34	3*n*	Δ
1902.36	171.8	14.48	1*n*	**Hu**

[Ma (*F. S.* I) ... Ma (**XI**) ... Δ (**II**) ... Cin 5 ...]

58 1 **7490.** **Σ 2006.** Some change in the positions of both companions.

A and B

1830.95	204°.5	1″.61	3*n*	Σ
1852.33	199.9	1.72	2*n*	Ma
1869.32	197.4	1.65	5*n*	Δ
1878.84	195.0	1.72	2*n*	β
1897.69	193.5	1.61	3*n*	Doo
1898.66	193.2	1.52	3*n*	Maw
1903.31	193.3	1.49	2*n*	Do

A and C

1830.62	223°.7	43″.54	2*n*	Σ
1868.47	221.1	44.31	4*n*	Δ
1879.26	219.6	44.58	1*n*	β
1894.47	219.0	45.02	1*n*	Big
1897.69	218.8	45.05	3*n*	Doo
1903.31	218.2	45.18	2*n*	Do

[Ma (*F. S.* I, **II**) ... Ma (**XI**, **XIII**) ... Δ (2194) ... Δ (**II**) ... Flm ... β 1 ... β 3 ... Big (*Bul. Ast.* **XII**, 299) ... Maw (**III**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ... Espin (*Mon. Not.* **LXIV**, 676) ... Do (3931) ...]

7491. **Σ 2004.** Fixed. 58m 12s

1866.45	277°.2	1″.78	3*n*	Δ
1902.36	279.2	1.77	1*n*	Hu

[Ma (*F. S.* I) .... Ma (**X**) .... Δ (**II**) .... Cin 5 .... Greenwich Obsy. (*Mon. Not.* **LX**, 506 ....]

7493. **β** *Scorpii.* **β 947.** (AC = **Ħ III. 7** = **Sh 217.**) 58 28
The close pair was discovered with the 18½-inch. The measures do not indicate any material change, but it is a physical system, as the components have a common proper motion. This movement is given by Auwers in his *Fundamental Catalogue* as 0″.037 in the direction of 241°.0. If the small star was fixed in space the change in the position of B would be very apparent in the time covered by the measures. The Herschel companion appears to be fixed with reference to A, and is therefore a member of the system. If C had no proper motion, its angle and distance in the interval between 1823 and 1888 would increase respectively 4°.7 and 2″.7. It is evident from the measures that no such change has taken place. The Harvard photometric magnitude of *β Scorpii* is 3.0, and of C 5.2.

A and B

1879.59	97°.3	0″.85	1*n*	Hl	...10
1880.06	88.4	0.91	5*n*	β	... 9.7
1881.50	92.7	0.96	3*n*	β	... 9.3
1887.59	99.2	1.09	2*n*	Hl	
1887.60	88.5	0.98	3*n*	Sp	
1889.41	93.9	0.94	5*n*	β	...10.8
1891.55	95.7	1.00	2*n*	Hl	...10
1892.41	95.8	1.03	3*n*	β	... 9.5
1897.57	90.6	1.00	3*n*	A	...11
1901.35	94.7	1.13	3*n*	Doo	

A and C

1782.29	25°.1	14″.37	1*n*	Ħ
1868.56	25.5	13.71	4*n*	Δ
1879.52	24.4	13.50	4*n*	β
1881.59	25.2	13.41	3*n*	β
1885.01	25.3	13.59	6*n*	En
1888.08	24.8	13.62	4*n*	Hl
1901.34	25.1	13.27	4*n*	Doo

The principal star was discovered by Slipher at the Lowell Observatory to be a spectroscopic binary (*Bul. Lowell Obsy.* No. 1).

[β (**XIII**) ... β 3 ... β 4 ... β (2957, 3142) (*Pub. L. O.* **II**) ... Sp (**II**) ... Hl (I, **II**) ... A (3465) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

A few only of the measures of AC are given. The following refer to this companion:

[P 1 ... P 2 ... Mitchel (Cin 2) (*Sid. Mess.* Sept. 1846) ... Ma (*F. S.* **I**, p. 213) ... Mu ... WJ 2 ... H 1 ... H (**VII**) ... BM (280) ... Oudemans (926) ... Se ... Ra (**XXI**, **XXII**, **XXVIII**) ... Hl (*Wash. Obsns.* 1863) ... Δ (1192) ... Δ (I) ... Pt ... En (2786) ... Cin 5 ... Tebbutt (*Mon. Not.* **L**, 23) ... Wilson (Cin 10) ... Cruls (*Annals Imp. Obsy. Rio de Janeiro* **IV**, Part 1) ... Glasenapp (**I**) ... Hu (*A. J.* 397) ... Doolittle (*A. J.* 564) ... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

7494. **Hn 127.** Fixed. 58 35

1905.33	131°.2	2″.09	Doolittle

[*Pub. Washburn Obsy.* **II** ... Com (**VI**) ... Innes (*Southern Double Stars*, p. 313) ...]

59ᵐ 20ˢ **7495.** **β 948.** *Librae* 213. (AC = Σ 2005 *rej.*) The duplicity of the principal star of Σ 2005 *rej.* was discovered with the 18½-inch. Gould puts this in *Ophiuchus*, 6.8 m. Lalande 29280.

A and B

1879.59	150°.5	1″.46	4*n*	β
1890.82	148.5	1.53	5*n*	Lv
1902.69	145.4	1.64	3*n*	Doo

A and C (= Σ 2005 *rej.*)

1835.6	230°.5	20″ ±	1*n*	H
1892.41	234.8	29.05	2*n*	Lv
1902.69	233.1	29.01	3*n*	Doo

A and D

1835.6	185°.0	35″ ±	1*n*	H
1892.41	194.9	52.72	2*n*	Lv
1902.69	194.3	52.77	3*n*	Doo

[β (**III**)....β^3....Lv^1....Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892).... H (*Cape Obsns.*)...Doolittle (*Pub. Flower Obsy.* **II**)...]

59 40 **7496.** **H 581.** Only the following since H:

1880.45	50°.6	18″.67	1*n*	Big	10.0...10.1

59 58 **7497.** **Σ 2009.** Probably fixed.

1866.46	303°.1	17″.03	3*n*	Δ
1881.54	303.5	17.50	3*n*	β
1905.14	303.3	17.27	1*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...Δ (**II**)...β^4....β^6...]

0 4 **7498.** **β 811.** Discovered with the 15½-inch at the Washburn Observatory. This star has a proper motion of 0″.109 in the direction of 297°.3 (*A. G. Berlin*). The components are obviously moving together.

1888.56	219°.0	3″.76	3*n*	Com	8.5...12.0
1889.49	220.7	3.70	3*n*	β	7.8...10.8
1899.28	221.5	3.88	2*n*	β	8.0...10.0
1900.44	222.4	3.75	3*n*	Doo	7.7...11.0

[β (**XII**)...β^4...β (2957) (*Pub. L. O.* **II**)...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

0 12 **7499.** **A. G. 201.** Double in *A. G. Bonn.* Measures by Espin (*Mon. Not.* LXII, 532).

0 27 **7500.** **Σ 2007.** (= **Sh 218.**) Change from proper motion.

1843.45	328°.5	33″.05	1*n*	Ma
1858.38	326.5	33.20	4*n*	Δ
1864.37	326.9	33.01	1*n*	En
1865.21	326.7	33.35	6*n*	Δ
1877.00	326.9	33.77	6*n*	Je
1890.42	325.3	33.96	4*n*	Gla
1898.32	325.1	34.27	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Se^1...En...En (1518, 1674)...Flm...Pt...Ra (**XXIV, XXXVIII, XXXIX**)....Δ (1192, 1572)....Δ (**I, II**)....Je (2351)....Giacomelli (**III**)...Cin^5...Cin^6...Glasenapp (**I, V**)...Doolittle (*Pub. Flower Obsy.* **I**)... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

0ᵐ 47ˢ **7501.** **Σ 2013** *rej.* The only measure is:

1905.47	285°.4	23″.02	1*n*	β^6	9.1...9.7

0 57 **7502.** 11 *Scorpii.* **β 39.** Discovered with the 6-inch. The measures do not show any relative motion, and the proper motion of the principal star of 0″.080 in the direction of 245°.8 (Auwers) belongs to the small star as well. There is a 13 m star, 313°.8 : 30″.0.

1879.49	258°.4	3″.33	3*n*	β
1880.48	256.9	3.20	1*n*	Cin
1882.38	254.6	3.36	2*n*	W
1888.44	259.4	3.33	1*n*	Lv
1889.44	257.7	3.25	2*n*	T
1899.38	258.3	3.31	2*n*	β

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β^3...Δ (**I**)...Kn...Pt...Cin^5...Cin^6... Wilson (Cin^{10})...Lv^1...T (3186)...]

1 12: **7503.** **H IV.** 115. "Identification very precarious." There is nothing in this place. It is certainly identical with Σ 2024 *rej.* (See No. 7553.)

1 21 **7504.** **Σ 2008.** No change.

1866.86	58°.7	8″.70	3*n*	Δ
1905.20	59.0	8.73	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se...Δ (**II**)...β^6...]

1 42 **7505.** **β 812.** Discovered with the 15½-inch at the Washburn Observatory.

1888.45	125°.2	0″.76	3*n*	Com
1900.91	125.4	0.90	5*n*	Doo
1905.30	123.9	0.83	4*n*	Doo

[β (**XII**)...β^4...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

1 54 **7506.** **β 949.** Discovered with the 18½-inch. The recent observations show a remarkable change in this pair. The positions of 1905 may belong in the opposite quadrant.

The following are all the measures:

1880.25	197°.8	0″.62	4*n*	β
1887.89	195.2	0.48	2*n*	Sp
1898.52	208.6	0.41	3*n*	A
1900.59	207.7	0.18	2*n*	A
1901.48	199.7	0.16	2*n*	A
1902.33	214.0	0.15 ±	1*n*	A
1903.51	Obl. in 216°		3*n*	A
1904.40	Doubtful		2*n*	A
1905.40	209.3	0.13	2*n*	A
1905.57	210.1	0.3 ±	1*n*	Doo

[β (**XIII**)...β^3...Sp (**III**)...A (3585) (*Bul. L. O.* No. 11) (*A. S. P.* **XV**, 217)...]

(See p. 1077)

2 1 **7508.** **A. G. 202.** Double in *A. G. Bonn.* Measures by Espin (3717).

$2^m\ 6{:}^s$ **7509.** **Glasenapp 4.** From Glasenapp (I).

(See p. 1077)

2 18: **7510.** **Glasenapp 5.** From Glasenapp (I).

(See p. 1077)

2 24 **7511.** **H 4834.** Nothing later but the following:

1890.46	15°4	19″91	2*n*	Gla	9.7...9.8

[Glasenapp (I)...]

(See p. 1077)

2 27 **7512.** **Weisse 30.** "Duplex 12″" in Weisse. No other measures.

[β5...]

2 34 **7513.** **Hu 660.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

2 40 **7514.** *κ Herculis.* **Σ 2010.** (= **H V. 8** = **Sh 219.**) A slight change in distance from proper motion. The movement of the large star is 0″088 in 262°8 (Auwers).

1840.88	9°4	31″15	3*n*	OΣ
1850.12	10.2	30.09	2*n*	OΣ
1858.12	9.9	30.52	4*n*	Δ
1867.12	9.9	30.36	5*n*	Δ
1872.91	10.7	30.18	3*n*	OΣ
1877.01	10.2	30.10	6*n*	Je
1879.09	10.5	30.18	4*n*	OΣ
1885.34	10.5	30.02	10*n*	Per
1890.40	9.7	29.88	2*n*	Gla
1898.47	11.2	29.66	3*n*	Doo

[Ma (324)... Ma (*F. S.* I)... Ma (**IX, X, XI, XIII**)...Ma (*Beiträge zur physischen Kenntniss des himmlischen Körper* Weimar, 1841)... H1... H (**VII**)....Se1....Se3....En....En (1518, 1674)....Du....Flm....Ra (**XXI, XXIV, XXIX**)... Pk... OΣ (**IX, X**)... Δ (1192)... Δ (**I, II**)... WS2... Sk2...Nobile (*Rend. della R. Accad. Sci.* Napoli, Nov. 1875)... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2198)...Pt...Goldney (2257)...Je (2369)...Sp (**II**)... Per... Per (2559, 2748)... Engelhardt (**II**)... Giacomelli (**III**)... Maw (**I**)... Glasenapp (**I, III**)....Doolittle (*Pub. Flower Obsy.* **I**)....*Annals Toulouse Obsy.* **III**...]

2 45 **7515.** **OΣ (App) 142.** No change.

1905.46	265°1	104″90	2*n*	β

[Δ (**I**)...Franz (2649)...β6...]

(See p. 1077)

2 48 **7516.** **Σ 2011.** Without change.

1868.75	69°5	2″26	4*n*	Δ
1889.96	65.5	2.54	3*n*	HΣ
1899.39	66.8	2.14	2*n*	Lewis

[Ma (*F. S.* I)...Ma (**X**)...Se...Δ (**II**)...Cin5...Lewis (*Mon. Not.* **LX**, 506)... HΣ (**XII**)...]

3 **7519.** **Hd 141.** There is no bright star in this place in the *Cordoba Zones.* Probably an error in Hd in magnitudes or place.

7521. **Arg. 29.** "Duplex" in O. Arg. N. Nothing later but the following: $3^m\ 17^s$

1903.35	140°6	26″49	3*n*	β	8.3...8.8

[Cin5...β6...]

7522. **Σ 2020** *rej.* There is an error of about 5′ Decl. in *Catalogus Novus.* The only measures are of late date. 3 27

1905.20	232°7	26″50	2*n*	$β^6$	9.1...9.4

7523. **A. G. 203.** "Dupl.?" in *A. G. Berlin*, but found single by Hu (*Bul. L. O.* No. 44) and Miller (*A. J.* 546). 3 27

7524. **Σ 2034.** Unchanged. 3 28

1867.99	117°3	1″27	4*n*	Δ
1895.58	115.0	1.12	8*n*	Com
1899.75	113.7	1.32	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X, XV**)... OΣ (**IX, X**)... Du... Δ (1125, 1194)... Big... Δ (**I**, pp. 75, 397)(**II**)...Seagrave (*Sid. Mess.* **II**, 22)...Cin5...de Ball (3017)...En (2662)...Hl (**I**)...Com (**VI, X**)... Knorre (3518)... Glasenapp (**V**)...]

7525. **Σ 2012** *rej.* From H (VIII). By one of H's "Queries" it appears that this star had been regarded as B. A. C. 5379. It is not that, but a star 48s *p* and 2′ 52″*n*. 3 32

1879.37	243°8	20″40	3*n*	Cin	9.0...10.5

[H (**VIII**)...H (*Mon. Not.* **XXXII**, 29)...β (*Mon. Not.* **XXXIV**, 376)...Cin5...]

(See p. 1078)

7526. **Ho 550.** Change in distance? 3 50

1902.35	298°5	15″71	4*n*	Doo
1905.72	298.7	16.09	1*n*	β

[Ho (3557)...β6...]

(See p. 1078)

7527. **β 355.** Discovered with the 6-inch. The measures, taken together, do not indicate any change. It is 56s *p* Σ 2015. In *Pub. L. O.* II a 13m companion is given 97°3 : 12″8, but this belongs to Σ 2015. 4 14

A and B

1878.83	269°5	0″40	3*n*	Sp
1886.67	280.0	0.36	7*n*	En
1887.57	269.5	0.35	5*n*	Sp
1886.61	273.8	0.4±	3*n*	Sp
1892.27	277.4	0.40	3*n*	β
1898.53	278.1	0.42	2*n*	Bowyer
1901.18	283.0	0.38	4*n*	Bryant
1903.34	274.4	0.44	1*n*	Lewis

[β (**VI**)...β (2062, 3142)(*Pub. L. O.* **II**)...Δ (**I**)... Sp (**II, III**)... En (2786)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 506; **LXI**, 486; **LXII**, 383; **LXIV**, 801)...]

7529. **Σ 2014.** (= **H 1287.**) Fixed. 4 28

1866.15	91°9	8″05	3*n*	Δ
1905.29	90.0	8.29	2*n*	β

[Ma (*F. S.* I)...Se...Δ (**II**)...β6...]

$4^m\ 29^s$ **7530.** **β 40.** Discovered with the 6-inch, April 27, 1870. This pair precedes all the β pairs in this catalogue in date of discovery. There does not appear to be any sensible change. Glasenapp measures a third star 9.8 m, 95°9 : 98″37 (1890.46) *2n*.

1890.46	354°7	5″71	*2n*	Gla	8.5...9.3
1891.48	355.2	5.07	*4n*	β	8.4...9.4
1903.47	352.3	4.84	*2n*	A	
1904.49	352.6	5.01	*3n*	Doo	

[β (I) ... β (*Mon. Not.* **XXXIII**, 351) ... β (3114)(*Pub. L. O.* **II**) ... Cin3 ... Cin4 ... Glasenapp (I) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

4 35 **7531.** τ *Coronae Borealis.* **β 1087.** Discovered with the 36-inch. τ *Coronae* has a considerable proper motion:

Auwers	0″343	in	348°4
Porter	0.346	in	349.8

It is obvious from an inspection of the measures that the small star is moving at the same rate. This movement of A is almost exactly in the opposite direction, and if the small star was fixed in space, its distance would increase annually by the amount given above, which would make the distance in 1898 more than double that given by the first measures. The following are all the measures:

1889.21	169°1	3″11	*3n*	β	5.5...13.8
1890.32	168.3	3.12	*3n*	β	...13.5
1891.32	170.7	3.17	*3n*	β	...14.2
1892.36	169.9	3.10	*3n*	β	...13.9
1898.37	172.9	3.17	*3n*	β	...14.0
1898.64	169.9	3.27	*3n*	A	...14.3

[β (**XV**) ... β (2929, 3048, 3114, 3142)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**) ... A (3585) ...]

4 51 **7532.** 12 *Scorpii.* **H 4839.** Probably fixed, and common proper motion of 0″101 in 238°4 (Auwers).

1834.69	81°7	4″62	*1n*	H	6½...10
1878.65	79.8	4.44	*5n*	Cin	6.5... 8.4
1890.48	79.7	4.03	*2n*	Gla	7.0... 9.5
1896.43	77.4	4.42	*3n*	Scott	6 ... 8
1897.48	77.5	4.14	*1n*	See	6 ... 8.7

[H3 ... Cin3 ... Cin5 ... Cin6 ... Glasenapp (I) ... Scott (*Brit. Ast. Ass'n* **VIII**, 66) ... See (3496) ...]

5 1 **7533.** ν *Scorpii.* **β 120.** (AC = **H** V. 6 = σ 509 = **Sh 220.**) The close pair was discovered with the 6-inch. The duplicity of Herschel's companion was discovered by Mitchel at Cincinnati in 1846, and independently by Jacob the following year. The measures of AB show no sensible motion, and the same may be said of CD. There has been no change in the distance or direction of the two pairs with reference to each other. The principal star, according to Auwers, has a proper motion of 0″042 in the direction of 251°9. The four components are evidently moving together, and undoubtedly form one vast quadruple system. This is in the midst of a complex nebulous area discovered by Barnard (*Mon. Not.* LIX, 367).

A and B

1876.35	360°0	0″73	*8n*	Δ
1876.53	361.5	0.67	*5n*	Sp
1878.35	363.7	1.04	*2n*	β
1879.03	360.2	0.74	*3n*	Cin
1879.58	362.0	0.65	*5n*	Sp
1880.00	366.2	0.66	*8n*	β
1881.45	366.7	0.81	*6n*	β
1882.55	359.9	0.72	*2n*	Sp
1887.39	364.3	0.68	*5n*	Hl
1888.36	362.8	0.95	*3n*	T
1888.41	364.1	0.80	*3n*	Lv
1889.44	361.2	0.80	*3n*	β
1895.48	362.8	0.81	*3n*	A
1897.48	360.6	0.71	*3n*	A
1901.42	365.5	1.07	*3n*	Doo

C and D (= Mitchel)

1868.51	41°3	2″03	*1n*	Hd
1875.42	47.9	1.89	*4n*	Δ
1877.78	45.6	2.08	*8n*	Sp
1879.41	45.2	2.07	*9n*	Cin
1881.31	46.6	2.02	*4n*	β
1886.51	49.5	2.10	*4n*	T
1886.61	45.8	2.05	*3n*	Hl
1888.42	48.3	2.22	*3n*	Lv
1897.48	48.7	2.02	*3n*	Scott
1897.48	43.6	2.05	*3n*	A
1897.60	45.5	1.78	*4n*	Barnard
1898.54	45.0	2.05	*2n*	Maw
1901.42	48.0	1.88	*4n*	Doo

AB and C

1821.36	338°2	40″82	*1n*	Sh
1875.43	336.8	40.77	*4n*	Δ
1879.58	337.7	40.98	*3n*	Sp
1881.60	336.6	40.97	*3n*	β
1886.61	336.5	40.91	*3n*	Hl
1897.60	336.4	41.12	*3n*	Barnard
1901.42	336.9	41.32	*3n*	Doo

[β (**III**) .... β (*Mon. Not.* **XXXIV**, 59: **XXXV**, 28) .... β1 .... β3 .... β4 .... β (2957) (*Pub. L. O.* **II**) ... Newcomb (*Wash. Obsns.* 1874) ... Δ (**I**) ... Δ (2186) ... Russell (*Sydney Obsns.* 1871–81) ... Cin4 ... Cin5 ... Cin6 ... Sp (**II**) ... Sp (2133) ... Hl (**I**, **II**) ... Pritchett (*Pub. Morrison Obsy.* **I**)(*A. J.* 397) ... Wilson (Cin10) ... LM ... Smith (*Mem. R. A. S.* **L**) ... T (2866, 2991) ... Lv1 ... Lv (*Sid. Mess.* **VIII**, 77) ... Hu (*A. J.* 397) ... A (3465)(*A. S. P.* **VII**, 305) ... Scott (*Mon. Not.* **LIX**, 427) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

The following relate to observations of the old components:

[H3 ... Wr ... WJ ... Se ... Se3 ... Mh ... Glasenapp (I) ... Sellors (3154) ... Maw (**III**) ... Scott (*Mon. Not.* **LXIV**, 52) ... Tebbutt (*Mon. Not.* **LXIV**, 67) ...]

7534. **Σ 2015.** (= **H** **I. 37.**) Probably without change. $5^m\ 10^s$

1782.76	149°8	....	*1n*	H
1802.72	155.0	....	*1n*	H
1829.99	159.3	2″68	*3n*	Σ
1843.61	161.5	3.15	*2n*	Ma
1857.62	158.6	2.67	*3n*	Se
1866.59	161.0	2.71	*3n*	Δ
1879.56	162.9	2.74	*2n*	OΣ
1881.50	160.5	2.95	*1n*	Big
1897.94	161.1	2.69	*2n*	Lewis
1901.05	158.9	3.24	*3n*	Espin
1905.60	161.3	2.69	*2n*	β

There is a faint companion more distant, noted with the 36-inch, but erroneously given in *Pub. L. O.* II and *Pub. Y. O.* I as belonging to β 355 which is 56^s *p* Σ 2015.

1892.27	97°3	12″8	1*n*	β
1898.53	98.6	12.68	2*n*	Gr. Obsy.
1905.60	98.7	12.50	2*n*	β

[Ma (*F. S.* I) . . . Ma (**X, XI**) . . . OΣ (**X**) . . . Δ (**II**) . . . Se . . . Big . . . Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 506) (*Gr. Obsns.* 1897) . . . Glasenapp (**V**) . . . Espin (*Mon. Not.* **LXII**, 529) . . . β^6 . . .]

5^m 15^s **7535. OΣ (App) 143.** The only later position is:

1883.56	84°3	46″52	5*n*	Franz

[Δ (I) . . . Franz (2649) . . .]

5 50 **7537. H 1288.** Not found by Glasenapp in 1890.

1901.94	121°5	19″33	2*n*	β	9.7 . . . 11.0

[Glasenapp (I) . . . β^6 . . .]

6 24 **7539. H 1289.** "Neat." Probably no motion.

1830+	237°4	10″±	1*n*	H	10 . . . 10
1880.52	238.9	11.39	1*n*	Big	10.7 . . . 11

[H (V) . . . Big . . .]

6 28 **7540. Σ 2016.** (= H II. 86.) Perhaps a little change in angle and distance.

1866.06	147°3	7″09	3*n*	Δ
1905.38	145.7	7.30	2*n*	β

[Ma (*F. S.* I) . . . Ma (**XI**) . . . Se . . . Δ (**II**) . . . *A. G. Leipzig*, p. 209 . . . β^6 . . .]

6 37 **7542. Σ 2017.** Probably a little change from proper motion.

1863.35	252°2	25″70	1*n*	En
1867.65	251.2	25.95	4*n*	Δ
1877.05	252.2	25.76	6*n*	Je
1900.45	252.8	26.60	2*n*	β
1903.39	253.6	26.76	2*n*	Do

[Ma (*F. S.* **II**) . . . H^2 . . . En . . . Δ (2194) . . . Δ (**II**) . . . Flm . . . Je (2369) . . . Pt . . . Big . . . Glasenapp (**V**) . . . *Annals Toulouse Obsy.* **III** . . . Do (3931) . . . β^5 . . .]

7 1 **7543. OΣ 307 *rej.*** Magnitudes from Δ. No evidence of change. The distance in Ma (XI) is obviously an error.

1867.90	202°8	17″43	4*n*	Δ
1898.52	201.9	17.70	4*n*	Hu

[Ma (**XI, XIII**) . . . Δ (**II**) . . . Hu (*Pub. L. O.* **V**) . . .]

7 5 **7544. OΣ 305.** Without change. Ma measures a distant star, 264°0 : 27″82 (1847.35) which Hu could not see with the 12-inch. The 40-inch shows nothing in that place, but there is a small star, 85°8 : 62″68 (1905.54).

1869.51	262°2	5″42	5*n*	Δ
1898.34	263.9	5.41	3*n*	Hu

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Δ (**I**) . . . Per . . . Per (2685) . . . Ho (2978) . . . Hu (*Pub. L. O.* **V**) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . β^6 . . .]

7545. Σ 2018 *rej.* Measures from β^5. No other observations. 7^m 10^s
(See p. 1078)

7546. OΣ 306. No sensible change since the first measures. The following are all the observations: 7 19

1843.33	35°9	0″3±	3*n*	Ma
1846.56	55.9	0.37	4*n*	OΣ
1846.64	24.4	0.3±	3*n*	Ma
1852.61	31.7	0.2±	1*n*	Ma
1865.47	50±	Obl.	2*n*	Δ
1884.39	43.0	0.38	3*n*	Per
1886.18	45.7	0.3±	1*n*	Ho
1886.54	37.0	0.34	3*n*	Hl
1887.64	36.1	0.4±	2*n*	HΣ
1898.31	40.7	0.36	3*n*	Hu

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Δ (**I**, p. 229) . . . Per . . . Per (2685) . . . Hl (**II**) . . . Ho (2978) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . .]

7547. Ho 551. Probably fixed. 7 27

1902.36	78°3	6″54	7*n*	Doo

[Ho (3557) . . .]

7549. Σ 2025. No material change. The measure n Se^3 (p. 42) belongs to some other pair. 7 39

1868.77	167°2	2″61	5*n*	Δ
1905.34	162.3	2.42	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . Cin^5 . . . β^6 . . .]

7550. Σ 2019 *rej.* Measures from *Washington Observations* 1862. A recent examination shows that these measures are erroneously credited to Σ 2019 *rej.*, unless there has been a decided change in angle and distance. 7 42

1900.45	152°8	22″36	2*n*	β^5	8.0 . . . 9.2

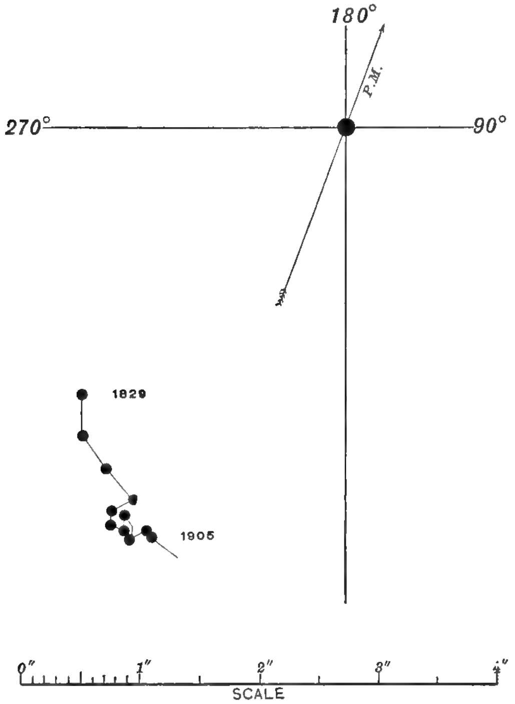
(See p. 1078)

7551. 49 *Serpentis.* **Σ 2021.** (= **H I. 82 = Sh 221.**) The components have a large common proper motion: 7 42

Auwers	0″448 in 159°4
Bossert	0.459 in 159.6
Porter	0.433 in 160.5

This may be a binary of very long period, or a system of the 61 *Cygni* class. The measures disclose nothing as to the character of the motion.

1829.48	315°.5	3″.20	3*n*	Σ
1845.41	319.6	3.43	2*n*	Da
1865.43	325.0	3.55	3*n*	Δ
1872.98	330.3	3.64	2*n*	OΣ
1876.45	328.9	3.81	3*n*	Hl
1882.45	329.6	3.92	3*n*	Hl
1887.48	331.3	3.91	4*n*	Hl
1888.86	330.3	3.79	3*n*	HΣ
1895.59	332.4	3.97	2*n*	Collins
1902.43	333.5	3.82	2*n*	Bowyer
1905.23	334.5	3.85	2*n*	β



49 Serpentis. Σ 2021

[Ma (*F. S.* **I**)...Ma (304, 324)...Ma (**IX, X, XI, XIII, XV**)... H^1... Mh... Da^1 ...Da^3...Wr...P^1... Fl... Se (975)... Se... Se^2... Se^3... Se (*Comp. Rend.* **XLI**, 271)...Ba (**II, III, IV**)...Hd...Ra (**XXII, XXVII, XXVIII, XXX, XXXI, XXXII, XXXIV, XXXV, XXXVIII**)...OΣ (**IX, X**)...En (1674, 2677)...WS... WS^2... Sk... Δ (1032, 1572)... Δ (*Mem. Accad. Sci.*)... Δ (**I, II**)... Bru... Ferr... Du... Do (2198)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Pl... Flm... Sp (2133)...Sp (**II**)...Per...Per (2529, 2685)...Pt...Je (2369)...de Ball (2753) ...T (2898)... Perry (*Eng. Mech.* **XXXVIII**, 192)... Giacomelli (**III**)... Jones (*A. J.* 312)...Hayn (3051)..Hl (*Wash. Obsns.* 1882, 1884)...Hl (**I, II**)...Hl (*A. J.* 301).... See (*Beob. Berlin* No. 6, 1892).... Glasenapp (**I, III**).... Maw (**I, II**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (**X**)... Knorre (3300)...Searle (*A. J.* 299)...Hu (*A. J.* 397)...Pritchett (*A. J.* 397)... Lehman (*Pub. A. S. P.* **IX**, 141).... Greenwich Obsy. (*Mon. Not.* **LIX**, 427; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)....*A. G. Leipzig*, p. 209....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)....Thiele (3837)....Boeger (*A. J.* 522)....Sk^5.... Biesbroeck...β^6...]

$7^m 48^s$ **7552.** Σ 2022. The later observers make the angle larger, but show very little motion.

1844.36	131°.2	2″.89	2*n*	Ma
1858.09	136.5	2.40	2*n*	Se
1865.90	134.1	2.67	3*n*	Δ
1879.53	136.7	2.72	2*n*	Hl
1884.48	135°.9	2″.79	3*n*	Hl
1885.41	135.1	2.68	2*n*	Per
1898.22	134.5	2.89	4*n*	Doo
1903.46	137.5	2.35	3*n*	Do

[Ma (*F. S.* **I**)... Ma (**XI**)... OΣ (**IX, X**)... Se... Δ (**II**)... Pt...β^1... Per...Per (2748)...En (2742)...Sp (**II**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Flm... Hu (*A. J.* 397)... Pritchett (*A. J.* 397)... Lewis (*Mon. Not.* **LX**, 507)... Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3931)...Biesbroeck...]

7553. Σ 2024 *rej.* *Herculis* 32. L 29627. This is identical with H IV. 115 (see No. 7503). The only later observations are: $7^m 49^s$

1900.49	44°.3	23″.76	2*n*	Espin	
1905.13	43.7	23.35	2*n*	β	6.7...10.4

[Espin (3717)...β^6...] (See p. 1078)

7554. Σ 2023. Perhaps a little change in the angle. 8 36

1842.85	231°.8	1″.52	6*n*	Ma
1865.54	229.8	1.17	2*n*	Se
1866.36	231.5	1.76	3*n*	Δ
1878.54	230.3	1.93	2*n*	Sp
1879.42	228.4	1.59	4*n*	Cin
1895.62	228.8	1.67	2*n*	Collins
1903.42	227.5	1.70	3*n*	Do
1905.53	226.7	1.65	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Se...Se^2...Flm...O. Stone (2201)...Cin^5... Cin^6...Δ (**II**)...Sp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Pt...Collins (*A. J.* 378) ...Pritchett (*A. J.* 397)...Glasenapp (**V**)...Doolittle (*Pub. Flower Obsy.* **I**)... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Do (3931)...]

7555. Σ 2030. Fixed. 8 38

1866.59	238°.7	5″.59	3*n*	Δ
1879.48	238.1	5.92	1*n*	β
1905.34	240.7	5.43	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...β^3...β^6...]

7556. Σ 2029. Without change. 8 58

1866.73	186°.0	6″.21	4*n*	Δ
1897.46	187.2	6.46	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se^2...Δ (**II**)...Glasenapp (**V**)...]

7558. Σ 2027. Without change. 9 19

1867.16	74°.1	1″.96	3*n*	Δ
1880.02	76.6	1.93	3*n*	Sp
1897.56	75.6	1.95	1*n*	Brown

[Ma (*F. S.* **I**)... Ma (**X**)... OΣ (**IX**)... Se... Δ (1209)... Δ (**I, II**)... Per... Per (2748)....Sp (**II**)....Glasenapp (**I, III**)....Brown (3645)....*Annals Toulouse Obsy.* **III**...]

7559. See 270. Discovered by Cogshall at the Lowell Observatory. 9 22

1899.43	139°.3	9″.00	2*n*	Cogshall

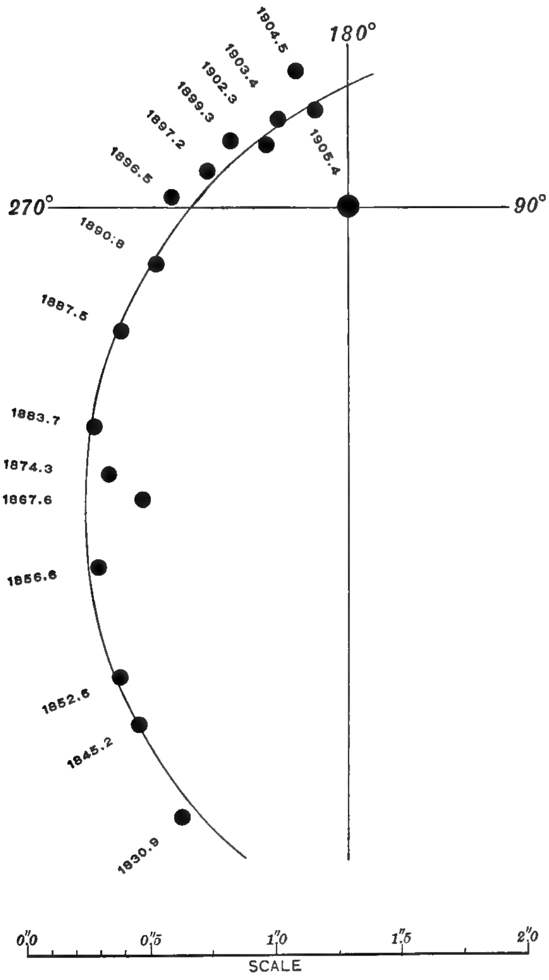
[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

$9^m\ 39^s$ **7560.** **Ho 401.** Nothing later but the following:

1902.37	298°3	4″62	3*n*	Doo

[Ho (3234)...]

10 5 **7561.** **Σ 2026.** A binary of long period. The orbit will necessarily remain uncertain until the companion has passed into the first quadrant.



Σ 2026

1830.94	345°9	2″54	4*n*	Σ
1845.20	338.2	2.25	4*n*	Ma
1852.63	334.3	2.11	2*n*	Ma
1856.57	325.6	1.78	2*n*	Se
1865.53	325.7	0.97	1*n*	Se
1867.64	325.3	1.45	4*n*	Δ
1874.33	318.7	1.45	2*n*	WS
1883.70	311.9	1.36	4*n*	En
1887.54	299.6	1.05	3*n*	HΣ
1890.84	287.6	0.81	1*n*	HΣ
1896.51	263.0	0.63	3*n*	Lv
1896.53	267.7	0.71	3*n*	A
1897.25	256.7	0.59	3*n*	A
1897.62	255.8	0.47	3*n*	Brown
1897.95	263°2	0″78	2*n*	Bowyer
1899.30	241.4	0.54	3*n*	A
1902.34	231.7	0.40	1*n*	A
1903.38	217.7	0.44	2*n*	A
1904.50	201.3	0.59	1*n*	Biesbroeck
1905.43	198.4	0.40	3*n*	A

From the measures to 1903, Biesbroeck finds a provisional period of 522 years. The curve shown on the diagram, which is part of a circle, would give a period of about 510 years.

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Se2...WS...WS2...Sk...Flm...Δ (**II**)... **En** (2677)... Lv (*A.J.* 407)... A (3395, 3465, 3639)... **Brown** (3645)... Bowyer and Lewis (*Mon. Not.* **LIX**, 400; **LX**, 507)... HΣ (**XII**)... Biesbroeck (pp. 62, 127)...Biesbroeck (3989)...]

(See p. 1078)

7562. **Σ 2031** *rej.* Measures by β^5. The principal star $10^m\ 9^s$
has a proper motion of 0″105 in 270° (*A. G. Nico.*).

(See p. 1078)

7563. *σ Coronae Borealis.* **Σ 2032.** (AC = **OΣ** 538; ABD 10 11
= **𝕳 I. 3** = **Sh** 222.) A binary system of long period. The orbits by various computors cover a wide range, but the arc described by the companion is so small, it is obvious that none of the periods are any better than mere guess-work. There are no observations prior to Struve which are of any value in such an investigation. It will require the measures of at least another century, and perhaps a much longer time, to give an approximate period. The system has a considerable proper motion:

Auwers	0″326 in 259°2
Porter	0.280 in 258.9

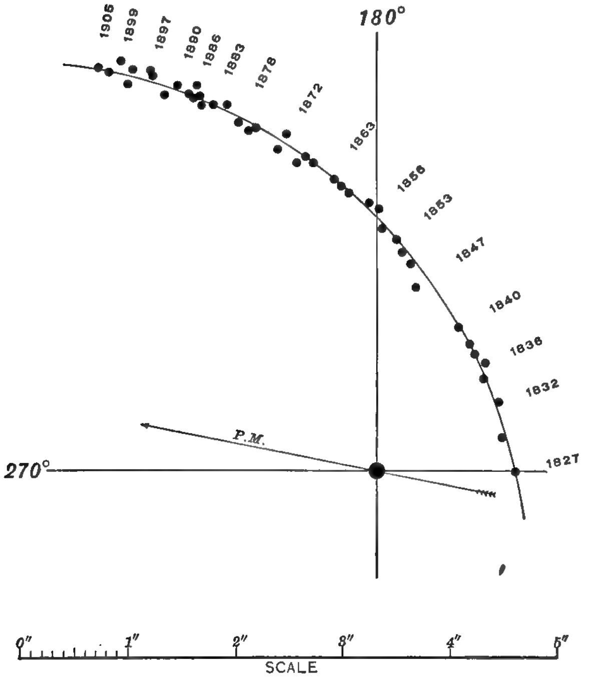
The following is a list of the orbits down to this time with the date of the last measures upon which they are respectively based:

1835	Herschel	286.6 yrs.	*Mem. R. A. S.* V, 204
1841	Madler	608.45	*Dorp. Obsns.* IX, 181
1845	Hind	736.88	*Mon. Not.* VII, 23; *A, N.* 551
1845	Madler	478.04	*Fixstern-System* I, 239
1853	Powell	240.	*Mon. Not.* XV, 90
1854	Jacob	195.12	*Mon. Not.* XV, 178
1855	Klinkerfues	420.24	*A. N.* 990
1872	Doberck	843.2	*A. N.* 2037
1876	Doberck	845.86	*A. N.* 2103; *Trans R. I. A.* XXV
1895	See	370.0	*Evolution of the Stellar Systems*

The following measured positions are shown on the diagram:

1827.02	89°3	1″31	4*n*	Σ
1830.11	104.9	1.22	3*n*	Σ
1832.99	118.8	1.30	3*n*	Σ
1833.50	130.5	1.31	5*n*	Σ
1836.59	134.7	1.43	6*n*	Σ
1837.55	140.0	1.42	5*n*	Σ
1838.45	143.4	1.48	7*n*	OΣ
1840.82	150.2	1.54	5*n*	OΣ
1847.02	168.7	1.74	3*n*	OΣ
1849.92	170.7	1.97	7*n*	OΣ
1852.13	173.4	2.06	0*n*	OΣ
1853.66	175.6	2.17	4*n*	OΣ
1855.29	179.1	2.27	6*n*	OΣ
1856.57	179.9	2.46	4*n*	OΣ
1858.01	181.9	2.51	5*n*	OΣ

1859.94	186°.1	2″.62	4*n*	OΣ
1861.58	187.4	2.69	5*n*	OΣ
1863.32	188.5	2.77	6*n*	OΣ
1865.36	191.9	2.94	3*n*	OΣ
1866.63	193.0	3.00	6*n*	OΣ
1868.58	194.7	2.98	2*n*	OΣ
1872.57	195.3	3.26	3*n*	OΣ
1873.56	197.6	3.14	2*n*	OΣ
1874.61	199.8	3.41	4*n*	OΣ
1878.03	201.0	3.40	11*n*	Δ
1878.50	202.0	3.51	5*n*	Δ
1882.01	202.8	3.70	7*n*	Hl
1883.47	204.5	3.77	3*n*	Hl
1884.48	206.0	3.80	3*n*	Hl
1885.43	205.7	3.89	3*n*	Hl
1886.48	206.9	3.96	6*n*	Hl
1887.44	205.5	3.99	4*n*	Hl
1888.44	206.6	3.91	4*n*	Hl
1890.33	207.8	4.08	3*n*	β
1892.62	209.9	4.06	3*n*	Com
1895.15	210.0	4.28	3*n*	HΣ
1897.77	209.9	4.31	3*n*	A
1898.23	211.7	4.41	5*n*	Hu
1899.79	212.4	4.53	8*n*	Doo
1901.29	213.2	4.32	2*n*	β
1903.39	214.4	4.51	8*n*	Doo
1905.53	214.9	4.59	3*n*	β



σ Coronae. Σ2032

If the projected ellipse, a portion of which is shown on the diagram, was the real orbit, the period would be about 1100 years.

There are two distant companions, the nearest discovered by H, and afterwards independently by OΣ (= OΣ 538), and the other by H, and measured by Σ. These stars have no connection with the binary, the change being due to the proper motion of AB.

The following are some of the measures of these stars:

A and C

1851.73	234°.1	21″.19	2*n*	OΣ	...12
1857.12	230.8	19.98	2*n*	OΣ	...13
1877.95	223.5	15.89	2*n*	Hl	...16
1880.39	221.4	15.06	1*n*	β	...13.5
1890.33	213.2	12.55	3*n*	β	
1898.47	209.0	11.23	4*n*	Hu	

A and D

1836.69	88°.8	43″.75	3*n*	Σ
1862.60	88.3	51.01	2*n*	Δ
1866.02	88.2	52.02	2*n*	Δ
1871.49	88.2	53.64	1*n*	Δ
1877.54	88.4	55.61	4*n*	Je
1880.39	87.6	55.82	1*n*	β
1888.62	88.2	57.58	1*n*	Maw
1903.43	86.1	62.01	4*n*	Do

[Ma (287, 304, 324. 452)... Ma (**IX, X, XI, XIII, XV**)... Σ1... Ma (*F. S.* **I**)... H1 ... H2... H (*Mon. Not.* **V**, 204)... Mh... Bp... Wr... J2... J3... WJ2... Da (*Mem. R. A. S.* **V**, 139)... Da1... Da2... Da3... Da4... *Gr. Obsns.* 1843... Hind (551)... Hind (*Mon. Not.* **VII**, 23)... Bond (*Am. Acad.* **II**, 144)... K... K (1519) ... Flm... Klinkerfues (990)... J (*Mon. Not.* **XV**, 178)... P1.. P (*Mon. Not.* **XV**, 90)... Se... Se2... Se3... Se (1017, 1614)... Hd... Ba (**II, III, IV**)... Bru ... Bru2... Du... Do (*Observatory* **II**, 213) (*Trans. R. I. Acad.* **XXV, XXIX**) ... Do (2037, 2103, 2198, 2242, 2433, 3023, 3466, 3680, 3931)... Do (*Handbook of Double Stars*, p. 118)... Ra (**XXVII, XXXIV, XXXIX, XLVII**)... Wn (**V**)... Wn (1738)... En (1518, 1674, 2677, 2742)... WS... WS2... Gl... Sk... Sk2... Sk3.... Δ (*Mem. Accad. Sci.*).... Δ (1032, 1114, 1194, 1474, 1573, 1735, 1799, 1886, 1979, 2080, 2193).... Δ (**I, II**).... Bl (**V**).... Pl.... Pk.... Hl (**I, II**).... Hl (*Wash. Obsns.* 1875-76, 1881-86).... Perry (*Eng. Mech.* **XXXVIII**, 192).... Nobile (*Rend. della R. Accad. Sci.* Napoli, Nov. 1875; Feb. 1876)... OΣ (**IX, X**, pp. 96, 175)... OΣ (*Mon. Not.* **XX**, 12)... Sp (2133)... Sp (**I, II, II** App)... Per... Per (2529, 2685, 2748)... Kustner (2584)... Je (2369, 2772, 3802)... Seagrave (*Sid. Mess.* **II**, 22).... Pt.... de Ball (2753).... T (2866).... Ho (2978).... Engelhardt (**II**)... Wellman (*Beob. Berlin*, No. 6, 1892)... Jones (*A. J.* 312)... Giacomelli (**III**)... Glasenapp (**I, III, IV, V**)... Maw (**I, II, IV**)... β1... β (3048) (*Pub. L. O.* **II**).. Big... Big (*Bul. Ast.* **XII**, 299)... Sk4... Everett (*Mon. Not.* **LVI**, 464)... Collins (*A. J.* 378)... Com (**X**)... Schwarzschild (3335)... Searle (*A. J.* 299)... Lv (*A. J.* 382, 407)... Pritchett (*A. J.* 397)... Hu (*A. J.* 427)(*Pub. L. O.* **V**)... A (*A. J.* 429)... Solá (3497)... Brown (3645)... Knorre (3518)... Ho (3558).... Coleman (*Mem. R. A. S.* **LIII**).... HΣ (**XII**).... Gl (*Mon. Not.* **LXI**, 556).... *Annals Toulouse Obsy.* **III**.... Hadley (*Pop. Ast.* **XIII**, 262, 331) ... Boeger (*A. J.* 522)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507, 518; **LXI**, 486; **LXII**, 383).... See (2339) (*A. J.* 359, 378) (*Evolution of the Stellar Systems*)... Doolittle (*A. J.* 416, 547) (*Pub. Flower Obsy.* **I, II**)... β5... Biesbroeck... β6...]

7565. Σ 2036. (AC = **H** 3345.) H did not see the Σ star, $10^m 29^s$
and Σ has no mention of the other. The close pair is apparently fixed.

A and B

1832.28	235°.3	2″.01	3*n*	Σ
1846.28	242.2	1.76	1*n*	Ma
1867.20	239.3	1.93	3*n*	Δ
1878.42	241.5	2.18	1*n*	β
1879.33	236.3	1.90	1*n*	Cin
1896.52	233.0	2.33	4*n*	Lv
1897.71	239.2	2.16	3*n*	Doo
1905.56	236.0	1.93	2*n*	A

A and C

1878.42	341°.1	15″.67	1*n*	β
1896.56	340.6	14.27	2*n*	Lv
1905.76	343.0	13.70	2*n*	β

[Ma (*F. S.* **I**)... Δ (**II**)... Cin6... β1... Lv (*A. J.* 407)... Doolittle (*Pub. Flower Obsy.* **I**)... β6...]

11^{m} 18^{s} **7567.** **H 585.** "Triple; a neat star." The nearest companion is about 30″ distance *np*; of no special interest (1874).

11 56 **7570.** *υ Coronae Borealis.* **Sh 223.** (ACD = **H III. 55** = **H V. 37 = σ 512.**) The principal star has a proper motion of 0″.026 in 171°.4 (Auwers).

A and B

1898.01	28°.7	55″.45	2*n*	Doo	...12.7
1905.05	28.7	54.50	1*n*	β	...13

A and C

1783.18	25°.6	78″.13	1*n*	H	
1879.32	22.4	86.31	2*n*	β	... 9.3
1897.90	22.4	85.35	5*n*	Doo	... 8.5
1905.05	22.1	86.67	1*n*	β	...10.8

A and D

1879.32	52°.2	123″.61	2*n*	β	... 9.0
1897.90	51.9	123.70	5*n*	Doo	... 8.0
1905.05	51.5	123.75	1*n*	β	.. 10

C and E

1905.05	226°.0	13″.34	1*n*	β	...11.5

[WS...WS^{2}...β^{3}...Doolittle (*Pub. Flower Obsy.* I)...β^{6}...]

11 56 **7571.** **Σ 2033.** Fixed.

1868.03	175°.4	10″.55	4*n*	Δ
1890.40	173.8	10.71	2*n*	Gla

[Ma (*F. S.* I)...Ma (XI)...H^{1}...H (IV)...Se...Δ (II)...Glasenapp (I)...]

11 57 **7572.** Measures from H (VIII). "Double" in *Brisbane.* These stars are Nos. 22108 and 22106 of the *Cordoba Catalogue*, 6...7¼.

1879.39	319°.7	22″.54	1*n*	Cin	6.5...7.5
1890.48	320.0	22.31	2*n*	Gla	4.5...5.9
1897.65	319.4	23.32	1*n*	See	6 ...7

[Cin^{5}...Glasenapp (I)...See (3496)...]

12 19 **7573.** **H 1291.** The only later observation is:

1900.48	124°.2	18″.62	2*n*	Espin (3717)

13 4 **7575.** **Sh 225.** (= **H V. 134 = σ 514.**) Lalande 29703–4. Probably without change.

1783.26	.....	45″.78	1*n*	H	
1879.30	332°.6	47.13	1*n*	Cin	6.0...7.0
1890.43	333.0	46.65	2*n*	Gla	6.9...7.4
1903.47	333.3	46.85	4*n*	β	7.3...7.4

[Cin^{5}...Glasenapp (I)...β^{6}...]

13 11 **7576.** **Σ 2035.** Without change.

1867.15	35°.4	2″.70	2*n*	Δ
1905.49	36.6	2.38	1*n*	β

There is a 12 m star, 325°.9 : 22″.8.

[Ma (*F. S.* I)...Ma (XI, XIII)...Δ (II)...Cin^{5}...β^{6}...]

7577. **Hn 128.** No other measures. 13^{m} 16^{s}

[*Pub. Washburn Obsy.* II...Com (VI)...]

7578. **Σ 2037.** Without change. 13 26

1866.86	239°.2	1″.46	3*n*	Δ
1899.45	236.6	1.35	1*n*	Bowyer

[Ma (*F. S.* I)...Ma (X)...Se...Δ (II)...Bowyer (*Mon. Not.* LX, 507)...]

7579. **Sh 226.** (= **H IV. 124 = σ 515.**) Lalande 29720. 13 29
Probably without change.

1783.22	27°.1	15″.40	1*n*	H	
1879.49	20.7	13.12	2*n*	Cin	7.5...8.5
1886.41	22.5	12.70	1*n*	Wilson	8.5...9.5
1890.43	20.9	12.35	2*n*	Gla	7.2...7.7
1903.44	21.6	12.81	3*n*	β	8.0...8.3

[H (VIII)...J^{2}...Ra (XXII)...Cin^{5}...Wilson (Cin^{10})...Glasenapp (I)...β^{6}...]

7580. **H 584.** R. A. 5^{m} uncertain in H. Identified and 13 34
measured:

1903.89	241°.0	16″.29	2*n*	β	9.2...10.6

[β (*Mon. Not.* XXXIV, 376)...β^{6}...]

7581. *σ Scorpii.* **Sh 224.** (= **H IV. 121.**) Fixed. The 13 54
principal star found to be a spectroscopic binary by Slipher (*Bul. Lowell Obsy.* No. 11). It has a proper motion of 0″.031 in 256°.8 (Auwers).

1889.44	271°.8	20″.85	2*n*	T
1896.49	272.1	20.61	2*n*	Hu

[Mh...J^{2}...Se^{1}...Se^{3}...Pk...Flm (*Ast. Reg.* XVII, 234)...Cin^{5}...Wilson (Cin^{10})...Cruls (*Annals Imp. Obsy. Rio Jan.* IV, Part 1)... T (3186)...Glasenapp (I)...Scott (*Brit. Ast. Ass'n* V, 75)...Hu (*A. J.* 397)...Do (3798)...]

7583. **Σ 3103** *rej.* Measures by β^{5} 14 24

7585. **A 225.** No other measures. 14 55

[A (3784) (*Bul. L. O.* No. 16)...]

7586. **β 1297.** Found in looking for H 4851 (No. 7600). 15 10

[β^{5}...]

7587. **OΣ 309.** The angle is slowly increasing. The 15 15
following are all the measures:

1846.90	236°.4	0″.52	4*n*	OΣ
1847.77	227.1	0.3±	7*n*	Ma
1870.23	233.9	0.36	5*n*	Δ
1870.33	232.1	0.3±	5*n*	Du
1885.41	240.8	0.48	2*n*	Per
1886.67	235.6	0.55	7*n*	En
1897.60	245.8	0.58	1*n*	Brown
1898.45	246.5	0.46	4*n*	Hu
1900.48	244.9	0.54	3*n*	Doo

[Ma (XI, XIII)....OΣ (IX)....Δ (I)....Du....Per....Per (2749)....En (2786)....Brown (3645)...Hu (*Pub. L. O.* V)...Doolittle (*Pub. Flower Obsy.* I)...]

15m 33s **7589.** **Σ 2041.** (= OΣ 308.) The identity of these two stars was unnoticed for a long time. The components seem to be fixed. The measure by Ma (XI, p. 59), 346°2 : 0″85 (1843.29) 2*n*, credited to OΣ 308, evidently belongs to some other pair.

1867.51	1°4	2″57	8*n*	Δ
1885.04	1.0	2.78	5*n*	Hl
1898.54	1.5	2.65	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**, p. 129) (**XIII**)...OΣ (**IX**)...Δ (**II**)...Flm...Pt...Per...Per (2685)....Lv^1....Hl (*Wash. Obsns.* 1885)....Hl (**II**)....β (*Mon. Not.* **XXXIV**, 376)...T (3185)...Pritchett (*A. J.* 397)...Brown (3645)...Hu (*Pub. L. O.* **V**)...Do (3931)...]

15 42 **7590.** **β 624.** Discovered with the 6-inch. Near 5 *Ophiuchi*. No sensible change.

1879.39	320°0	1″25	3*n*	Cin
1891.51	322.2	1.17	6*n*	β
1895.63	316.1	1.15	3*n*	A
1901.40	321.9	1.20	2*n*	β
1904.49	320.3	0.96	3*n*	Doo

[β (**X**)...β^1...β (3114) (*Pub. L. O.* **II**)...Cin^5...Cin^6...A (*Ast. Soc. Pac.* **VII**, 305)...β^5...Doolittle (*Pub. Flower Obsy.* **II**)...]

16 8 **7591.** **Hu 481.** Later measures are:

1903.49	226°9	0″41	2*n*	Gr. Obsy.

[Hu (*Bul. L. O.* No. 21)...Lewis and Bowyer (*Mon. Not.* **LXIV**, 801)...]

16 8 **7592.** τ *Herculis*. **β 1198.** Discovered with the 36-inch. Auwers gives the proper motion of τ *Herculis* 0″035 in the direction of 330°5. It is uncertain from the measures whether or not the companion shares this movement.

The following are all the later measures:

1892.40	145°6	6″70	1*n*	β	...14.0
1898.51	145.0	6.79	2*n*	β	...14.0
1898.64	149.4	7.10	3*n*	A	...14.2

[β (**XVII**)...β (3048, 3142) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)...A (3585)...]

16 14 **7593.** Measured in connection with Σ 3103 *rej.* The companion is SD (3°) 3930. The meridian positions in Lamont give:

1855.5	22°7	92″44

[β^5...]

16 37 **7595.** **Hu 662.** With a later measure the mean is:

1904.34	223°9	4″19	3*n*	Hu	8.5...12.0

[Hu (*Bul. L. O.* No. 57)...]

16 38 **7596.** γ *Herculis*. **Sh 227.** (= **H** V. 19 = σ 516 = OΣ (App) 144. Magnitudes from OΣ; Δ, 3.8...8.8. The principal star has a small proper motion:

Auwers	0″083 in 308°6
Rechenberg	0.080 in 305.3
Measures of B	0.066 in 340.3

The last value is derived from the five sets of measures of the companion by OΣ, Δ, Doo, and β.

1782.82	249°0	39″45	2*n*	H
1844.09	242.0	40.36	3*n*	OΣ
1874.15	238.8	40.51	3*n*	Δ
1875.55	239.6	40.49	2*n*	OΣ
1897.38	236.9	41.09	3*n*	Doo
1903.40	236.8	40.98	4*n*	β

[OΣ (**X**)...Δ (**I**)...Flm...Big...Franz (3464)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

7597. **Ho 402.** Ho mentions a 13m star, 155°4 : 40″81. 16m 47s

[Ho (3234)...]

7598. **Hu 482.** A later position is: 16 56

1903.50	148°4	1″58	1*n*	Bowyer

[Hu (*Bul. L. O.* No. 21)...Bowyer (*Mon. Not.* **LXIV**, 801)...]

7599. **H 4850.** (= **H** N. 39.) B. A. C. 5464. "Very fine star." No measures in H. Distances discordant, and change doubtful. The components appear to have a common proper motion of 0″122 in 154°6 (Bossert). 17 7

1835.93	348°3	7″54	3*n*	H	
1851.38	347.8	7.09	2*n*	WJ	
1879.11	350.6	6.67	4*n*	Cin	5.9...7.3
1882.41	352.1	6.91	1*n*	Wilson	
1890.43	350.3	6.35	2*n*	Gla	6.7...7.4
1903.54	350.7	6.35	5*n*	Jouffray	
1903.66	350.1	6.25	1*n*	Scott	

[H^3....WJ....Hd....Cin^4....Cin^5....Wilson (Cin^{10})....Glasenapp (**I**)....Scott (*Brit. Ast. Ass'n.* **V**, 75) (*Mon. Not.* **LXIV**, 52)...See (3496)...Do (3798)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

7600. **H 4851.** Examined with the 12-inch (1891) and no such star found in this place. Also looked for with the 40-inch in 1901. It is apparent now that there is an error of 1h in the R. A. of Herschel, making H 4851 identical with H 4948 (No. 7982), the place of which is: 17 7

R. A. = 17h 17m 9s
Decl. = −22° 41′

7601. **Ho 403.** No other measures. 17 13

[Ho (3234)...]

7602. **Σ 2039** *rej.* Measures by β^6. 17 15

7603. **β 41.** Discovered with the 6-inch. Probably fixed. Σ 2045 is *sp* in a low-power field. 17 26

1893.46	64°1	2″41	3*n*	W
1897.71	62.5	2.22	3*n*	Doo
1898.63	61.6	2.36	3*n*	A

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Δ (**I**)...Wilson ( )...A (3585)...Doolittle (*Pub. Flower Obsy.* **I**)...]

$17^{m}\ 29^{s}$ **7604.** **Σ** 2038 *rej.* Measures from β^{5}. No other observation since Struve.

17 33 **7605.** **Σ 2040.** (= **H II. 88 = S 677.**) Fixed.

1865.73	313°.6	6″.73	3*n*	Δ
1895.42	311.3	6.71	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**IV**)...]

17 42 **7606.** **H N. 81.** Place as given in H. The principal star is ν^{1} *Coronae.* (See No. 7608.)

17 47 **7607.** **Hn 129.** No later measures.

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

17 50 **7608.** ν^{1} and ν^{2} *Coronae Borealis.* (A*a* = **H N. 81**; AB = **Σ 29, App. I**; B*b* = **H VI, 118.**) Some change in the large stars from proper motion.

The following are the other measures of this group:

A and *a*

1903.40	237°.5	67″.52	2*n*	β

A and B

1866.56	165°.3	369″.41	9*n*	Δ
1878.40	165.3	367.88	8*n*	Je
1891.59	165.0	366.63	3*n*	Mai

B and *b*

1795.22	10°.9	Cl. VI	1*n*	H
1879.90	15.9	104″.18	2*n*	Bl
1903.40	16.2	103.61	2*n*	β

[Ra (**XXV**)...Δ (1574)...Δ (**II**)...Pk...Je (2340)...β^{3}...Bl (**V**)... Maiebckato (*Obsns.* 1892)...β^{6}...]

18 13 **7609.** **β** 1115. Discovered with the 36-inch. This is in the field with 5 *Ophiuchi* (= Sh 228).

1897.42	18°.4	0″.72	3*n*	A
1897.65	26.7	0.97	1*n*	See
1898.47	23.5	1.02	2*n*	Doo
1905.46	21.9	0.92	6*n*	Doo

The proper motion of Lalande 29840 is given by Porter as 0″.064 in the direction of 225°.3. The components are therefore moving together in space, and doubtless form a binary system. The proper motion of 5 *Ophiuchi* is 0″.046 in the direction of 258°.7 (Rad³.). (See No. 7613.)

5 *Ophiuchi* and β 1115

1846.21	253°.8	161″.00	1*n*	J
1889.39	253.0	156.43	3*n*	β
1890.41	253.2	155.97	2*n*	Gla
1898.33	253.3	156.26	4*n*	Doo

[β (**XVI**)...β (2956) (*Pub. L. O.* **II**)... A (3465)... See (3495)... Glasenapp (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

7610. **See 277.** (= **Innes 94.**) The only later measure is: $18^{m}\ 16^{s}$

1902.51	205°.8	0″.68	1*n*	Innes

[See (*A. J.* 431).... Innes (3406) (*Mon. Not.* **LVII**, 533; **LXIII**, 76) (*Annals Cape Obsy.* **II**)...]

7611. **Ho 404.** Later measures are: 18 19

1903.77	109°.6	1″.20	3*n*	Doo

[Ho (3234)...]

7612. 23 *Herculis.* **H V. 38.** (= σ 518 = **S 678 = OΣ (App) 145.**) The large star has a very small proper motion, 0″.020 in 146°.2 (Auwers). The following are all the measures since 1783: 18 20

1825.46	20°.4	36″.84	2*n*	S	
1840.58	19.7	36.20	1*n*	OΣ	6.0...8.5
1874.59	18.9	34.90	4*n*	Δ	6.4...9.0
1875.55	18.6	35.09	2*n*	OΣ	
1885.80	18.6	34.57	4*n*	Fr	
1904.54	17.9	34.11	3*n*	β	

[H (**II**)...OΣ (**X**)...Δ (**I**)...Franz (3080)...β^{6}...]

7613. 5 *Ophiuchi.* **Sh 228.** (= **H II. 19.**) There may be a little change in the close pair. The large star has a proper motion of 0″.045 in 258°.5 (Auwers). 18 23

The distant star, D, is a close pair (see No. 7609).

A and B

1782.30	7°.8	....	1*n*	H	
1804.45	7.9	....	1*n*	H	
1834.35	2.3	4″.11	1*n*	H	6 ...6
1877.50	358.3	3.55	3*n*	Cin	5.0.. 5.8
1877.52	357.3	3.29	3*n*	Sp	
1879.36	357.4	3.75	2*n*	Cin	
1889.39	355.0	3.41	3*n*	β	5.5...5.8
1903.48	353.2	3.36	5*n*	Jouffray	

A and C

1889.39	359°.8	151″.15	2*n*	β	...8.0
1890.41	360.6	151.25	2*n*	Gla	...7.4

A and D (D = β 1115)

1889.39	253°.0	156″.43	3*n*	β	...8.0
1890.41	253.2	155.97	2*n*	Gla	...7.0
1898.33	253.3	156.26	4*n*	Doo	

[H^{3}...P^{1}...Ra (**XXI**)...Se...J^{2}...Cin^{4}...Cin^{5}...Sp (**II**)...LM...Wilson (Cin^{10})...T (3186)...Glasenapp (**I**)...Tebbutt (*Mon. Not.* **LIII**, 372: **LVI**, 353; **LXIV**, 67)....β (2957) (*Pub. L. O.* **II**)....Lehman (*Pub. A. S. P.* **IX**, 141).... Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon. Not.* **LXIV**, 52)...See (3496)...Solá (3529)...Do (3798)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

7614. **See 278.** Discovered by Cogshall at the Lowell Observatory. 18 24

1900.46	325°.4	0″.76	3*n*	Cogshall	8.3...8.8

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

18^m 39^s **7615.** **Σ 2045.** Without change.

1869.78	181°.6	2″.20	5*n*	*Δ*
1898.63	181.9	2.29	3*n*	A

[Ma (*F. S.* **I, II**)...Ma (**XIII**)...See...*Δ* (**II**)...A (3585)...]

18 41 **7617.** **β 950.** Discovered with the 18½-inch. No sensible motion.

1888.46	350°.9	....	1*n*	Lv
1892.37	354.5	1″.07	3*n*	*β*
1904.49	350.6	0.93	3*n*	Doo

[*β* (**XIII**)...*β*^{3}...*β* (3142) (*Pub. L. O.* **II**)...Lv^1...Doolittle (*Pub. Flower Obsy.* **II**)...]

18 46 **7618.** **A 25.** Later measures give:

1898.13	111°.1	5″.27	2*n*	A	7.0...11.0

[A (3395, 3585, 3635)...]

18 59 **7619.** **β 951.** Discovered with the 18½-inch. Near *ν Coronae.*

1892.24	55°.4	0″.91	3*n*	*β*
1899.41	51.7	0.87	3*n*	Lewis
1900.67	51.9	0.85	2*n*	Bryant
1901.50	55.1	0.99	3*n*	Doo
1902.29	53.0	0.89	5*n*	Gr. Obsy.

[*β* (**XIII**)....*β*^{3}....*β* (3142) (*Pub. L. O.* **II**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

19 31 **7620.** **Hn 130.** No other measures.

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

19 41 **7621.** **Σ 2047.** Unchanged.

1868.13	331°.4	2″.03	4*n*	*Δ*
1900.40	331.5	2.24	1*n*	Espin

[H^1....Ma (**X, XI**)....Ma (*F. S.* **I**)....*Δ* (1125, 1192)....Ra (**XXV**)....Du....*Δ* (**I, II**)...Glasenapp (**IV**)...Knorre (3632)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXIV**, 676)...]

19 49 **7622.** **O. Stone 32.** Probably fixed.

1897.48	342°.4	9″.41	1*n*	See

[Cin^6...Wilson (Cin^{10})...See (3496)...]

19 50 **7623.** **Σ 2046.** Probably unchanged.

1865.76	224°.2	7″.72	3*n*	*Δ*
1879.31	224.3	8.21	1*n*	Cin

[Ma (*F. S.* **I**)...Se...*Δ* (**II**)...Cin^6...]

19 53 **7624.** *ω Herculis.* **β 625.** Discovered with the 18½-inch. Auwers (*A. N.* 3509) gives the corrected proper motion of this star 0″.065 in the direction of 159°.1, which corresponds to the change in the distant companion C. It is probable, therefore, that this star has no sensible motion of its own, and that AB form a physical system.

All the later measures of both companions are given:

A and B

1885.51	183°.2	2″.11	2*n*	HΣ
1890.38	178.2	1.76	2*n*	*β*
1898.50	184.3	1.86	3*n*	A
1901.53	182.0	2.03	3*n*	Doo

A and C

1890.37	103°.5	33″.41	3*n*	*β*
1898.50	102.7	32.96	3*n*	A
1901.53	102.1	32.61	3*n*	Doo
1904.40	101.8	31.93	2*n*	*β*

[*β* (**X**)...*β*^{1}...*β*^{3}...*β* (3048) (*Pub. L. O.* **II**)...A (3585)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...*β*^{6}...]

7625. **Σ 2044.** (= **Sh 229.**) Fixed. 19^m 54^s

1868.23	344°.4	8″.34	4*n*	*Δ*
1889.79	342.6	8.51	6*n*	Giacomelli
1903.47	343.4	8.50	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...Ra (**XXIII**)...*Δ* (1192)...*Δ* (**I, II**)...Big...Je (2369, 2449)...Giacomelli (**III**)...Per...Per (2748)...Sp (**II**)...Glasenapp (**III**)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* **III**...Maw (**III**)...Boeger (*A. J.* 522)...Do (3931)...]

7626. **Σ 2042** *rej.* Measures by *β*^{5}. 19 56

7627. **Σ 2043.** Fixed. 20 4

1867.40	86°.9	9″.71	4*n*	*Δ*
1904.47	84.4	9.56	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin^5...*β*^{6}...]

7628. **Ho 405.** No change. 20 16

AB	1903.34	338°.6	3″.34	3*n*	Doo
AC	1903.34	328.6	13.89	3*n*	Doo

[Ho (3234)...]

7630. **OΣ 310.** Apparently fixed. 21 11

1869.45	224°.6	2″.98	4*n*	*Δ*
1898.49	223.9	2.95	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7631. *α Scorpii.* (*Antares.*) Discovered by Mitchel with the 11-inch at Cincinnati in 1845, but it had been seen by Grant in India in 1844, and a double immersion noticed by Burg during an occultation in 1819. In the measures given by Mh, the angle was measured on only 2*n*; distance 16*n*. The observations show no relative change. The principal star has a small proper motion, 0″.039 in 235°.7 (Auwers), which is shared by the companion. The magnitude of the small star is from *Δ*. 22 3

1848.02	273°.2	3″.46	5*n*	Da
1856.41	273.5	3.00	14*n*	Se
1867.22	271.1	2.99	6*n*	*Δ*
1877.56	271.5	3.25	4*n*	Hl
1880.02	271.7	2.92	2*n*	β
1885.74	271.3	3.03	5*n*	Hl
1897.59	270.1	2.97	3*n*	Barnard
1903.41	274.2	3.18	3*n*	Doo

[Burg (*Mon. Not.* **II**, 25)...Mh...Mh (*Sid. Mess.* **I**, pp. 7, 49, July, Dec. 1846)... Bond (*Am. Acad.* **II**, 144)...Maclear (*Mon. Not.* **XVI**, 222)...Da (*Mon. Not.* **XVI**, 143; **XXIV**, 196)...Da^3... Da^4... P^1...P^2...Wr...J (*Mon. Not.*, **XIV**, 242)...WJ^2...J^3...Se^1...Se^2...Se^3...Se (975, 1017, 1614)...Se (*Comp. Rend.* **XLI**, 271)...Kn...WS...Gl...Hd...Pt...OΣ (**X**)... Sp (2133)...Sp (**II**)... *Δ* (1574)... *Δ* (**I**)...Cin^4...Cin^5... Wilson (Cin^{10})... Lv^1... Flm (*Ast. Reg.* **XVII**, 233)....Hl (*Wash. Obsns.* 1884, 1886)....Hl (**I**, **II**)....T (3186)....See (*Beob. Berlin*, No. 6, 1892)...β^2...β^3...Glasenapp (**I**)...Sk^4...Sellors (3303) ...Hu (*A. J.* 397)...Scott (*Brit. Ast. Ass'n* **VIII**, 66)(*Mon. Not.* **LXIV**, 52)... See (3496).... Tebbutt (*Mon. Not.* **LXI**, 501).... Boeger (*A. J.* 522).... Innes (*Annals Obsy. Cape Good Hope*, Vol. **II**, Part 4).... Doolittle (*Pub. Flower Obsy.* **II**)...]

22^m 12^s **7632.** **Σ 2054.** *Draconis* 99. There may be a little change in the angle.

1841.44	6°.9	1″.08	5*n*	OΣ
1855.63	2.0	1.01	3*n*	OΣ
1859.40	2.8	0.92	2*n*	Ma
1866.17	3.5	1.12	5*n*	*Δ*
1874.51	0.7	1.05	4*n*	*Δ*
1883.47	2.0	1.27	7*n*	En
1883.67	358.8	1.15	4*n*	Je
1885.44	0.2	1.09	3*n*	Hl
1889.69	358.4	1.11	3*n*	Maw
1900.53	1.6	1.25	3*n*	Doo

[H^1...Ma (*F. S.* **I**)...Ma (**XI**, **XIII**, **XV**)...Se...Se (*Comp. Rend.* **XLVIII**, 375) ...Flm... *Δ* (1125)... *Δ* (**I**, **II**)... OΣ (**IX**)... Seagrave (*Sid. Mess.* **II**, 22)... Per...En (2677)...Je (2772)...Hl (*Wash. Obsns.* 1885)... Hl (**II**)... Maw (**I**, **III**)...Glasenapp (**III**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378) ...Greenwich Obsy. (*Mon. Not.* **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIV**, 801)... Doolittle (*Pub. Flower Obsy.* **I**).... Boeger (*A. J.* 522),... Espin (*Mon. Not.* **LXIV**, 676)...]

(See p. 1078)

22 20 **7633.** **Σ 2048.** Relatively fixed, but a common proper motion of 0″.114 in 195°.1 (Bossert).

1866.17	301°.3	4″.54	3*n*	*Δ*
1890.42	301.9	4.46	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**, **XIII**)... Mh... Se... β^1... Cin^5... *Δ* (**II**)... Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...]

22 22 **7634.** *η Draconis.* **OΣ 312.** There appears to be a little increase in the distance. The components have a common proper motion:

Auwers	0″.061 in 339°.5
Newcomb	0.060 in 346.5

1843.65	149°.6	4″.40	2*n*	Ma
1851.21	142.3	4.86	4*n*	OΣ
1860.11	142.1	4.99	2*n*	OΣ
1868.85	141.1	4.88	7*n*	*Δ*
1870.52	142.4	5.01	3*n*	Du
1878.82	141.6	5.37	2*n*	β
1884.72	141.7	5.22	4*n*	Per
1888.24	143.5	5.06	3*n*	T
1898.47	142.5	5.37	3*n*	Hu
1901.40	143.1	5.37	3*n*	Doo

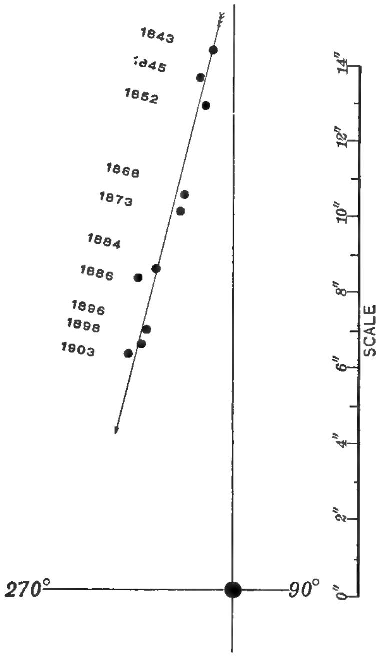
[Ma (**XI**, **XIII**)... Da^3... OΣ (**IX**, **X**)... *Δ* (1114)... *Δ* (**I**)... Du... Hd... Pk... Seagrave (*Sid. Mess.* **II**, 22)...WS...En (2678)...Per...Per (2529)...β^1...β^3... T (2991)...Downing (*Mon. Not.* **XXXVIII**, 328)...Lynn (*Mon. Not.* **XXXIX**, 371)... Maw (**I**, **III**)... Greenwich Obsy. (*Mon. Not.* **LX**, 507; **LXIV**, 801)... Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**, **II**)...Espin (*Mon. Not.* **LXIV**, 677)...Lau (*Bul. Ast.* **XXII**, 238)...]

7635. **A 226.** No other measures. 22^m 25^s

[A (3784) (*Bul. L. O.* No. 16)...]

7636. **HΣ.** (= **Hu** 483; AC = **OΣ** 311.) The close companion to the principal star of OΣ 311 was discovered by Hermann Struve in 1887, and independently later by Hussey at the Lick Observatory in 1902. His measures show no change: 22 34

1902.49	299°.8	1″.74	3*n*	Hu	8.2...13.0



OΣ 311. AC

The change in the OΣ companion is due to proper motion, presumably of the larger star. From the measures of C to 1898 Hussey gives this motion, 0″.138 in 165°.2. The new companion is certainly moving with A. There are no other measures.

1843.29	182°.3	14″.28	2*n*	Ma
1845.86	183.8	13.56	2*n*	OΣ
1852.46	183.5	12.81	1*n*	OΣ
1868.57	187.2	10.49	5*n*	*Δ*
1873.47	188.1	10.15	1*n*	OΣ
1884.45	193.6	8.70	3*n*	Per
1886.06	197.0	8.58	7*n*	En
1896.47	198.6	7.12	3*n*	A
1896.46	198.5	7.34	3*n*	Lv
1898.21	200.2	7.00	4*n*	Doo
1898.48	200.7	6.91	3*n*	Hu
1903.42	205.4	6.30	2*n*	Do
1903.50	202.2	6.50	2*n*	Gr. Obsy.

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (I) ... Per ... Per (2685) ... En (2786) ... Flm ... WS2 ... A (3396) ... Lv (*A. J.* 407) ... Glasenapp (**V**) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* I) ... HΣ (**XII**) ... Do (3931) ... Greenwich Obsy. (*Mon. Not.* **LXIV**, 801) ...]

$22^{m}\ 58^{s}$ **7637.** Σ 2049. Some change in the angle, but the motion is very slow.

1829.61	215°.2	1″.07	3*n*	Σ
1836.54	216.1	1.03	3*n*	Σ
1842.63	217.6	1.00	3*n*	Ma
1852.41	219.0	1.16	6*n*	OΣ
1868.26	211.9	1.13	4*n*	Δ
1877.40	207.6	1.21	4*n*	Sp
1882.46	206.3	1.42	1*n*	OΣ
1882.46	205.6	1.10	1*n*	HΣ
1885.68	210.7	1.26	7*n*	Per
1887.08	209.7	1.06	7*n*	Hl
1891.66	208.8	1.17	3*n*	Maw
1895.05	211.7	1.06	4*n*	Gla
1903.50	204.9	1.12	1*n*	Biesbroeck

[H1 ... Ma (*F. S.* **I**) ... Ma (**X**) ... Se ... Du ... OΣ (**IX, X**) ... Δ (1125, 1192) ... Δ (I, **II**) ... Per ... Per (2685) ... Do (2198, 3680) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (**II**) ... Com (**VI**) ... T (2991) ... Giacomelli (**III**) ... Hl (*Wash. Obsns.* 1880) ... Hl (**II**) ... Glasenapp (**III**) ... Collins (*A. J.* 378) ... Glasenapp (**IV**) ... Brown (3645) ... Knorre (3518) ... Coleman (*Mem. R. A. S.* **LIII**) ... HΣ (**XII**) ... Maw (**IV**) ... Biesbroeck ...]

23 2 **7638.** β 813. Discovered with the 15½-inch at the Washburn Observatory. The later measures show no change.

1888.61	165°.4	1″.09	3*n*	Com
1900.97	167.6	1.08	6*n*	Doo
1900.99	167.9	1.03	6*n*	Gr. Obsy.
1901.70	169.1	1.07	3*n*	A

[β (**XII**) .... β4 .... Com (**VI**) .... Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383) .... A (*Bul. L. O.* No. 11) .... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**) ....]

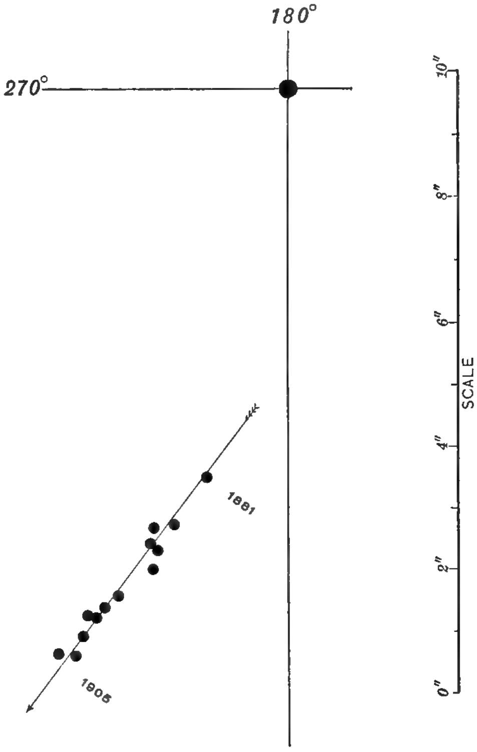
23 9 **7639.** β 814. Discovered with the 15½-inch at the Washburn Observatory. The measures show no sensible change.

1891.32	324°.1	0″.31	3*n*	β
1896.43	331.9	0.25	2*n*	Com
1898.47	325.9	0.29	2*n*	Doo
1898.97	324.1	0.30	2*n*	Lewis
1898.67	326.4	0.35	3*n*	A
1901.18	319.4	0.33	4*n*	Bryant
1901.45	321.2	0.34	2*n*	Doo

[β (**XII**) ... β4 ... β (3114) (*Pub. L. O.* **II**) ... Com (*Pub. Washburn Obsy.* **X**) ... Doolittle (*Pub. Flower Obsy.* **I, II**) .... A (3585) .... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXI**, 486; **LXII**, 383) ...]

23 16 **7640.** β 815. Discovered with the 15½-inch at the Washburn Observatory. The change shown by the measures is certainly due to proper motion of one star or the other. Porter finds no evidence of this in the meridian observations of A. From a comparison of A with DM (43°) 2608, and both components with a small star closely *sf*, it is certain that the proper motion is in the companion.

1881.30	348°.4	6″.42	3*n*	β
1886.40	344.5	7.28	7*n*	En
1888.95	343.2	7.42	4*n*	Com
1889.43	343.3	7.68	3*n*	β
1890.33	344.4	7.76	3*n*	β
1892.17	344.5	8.07	3*n*	β
1896.47	341.6	8.65	3*n*	Lv
1896.59	337.8	8.73	2*n*	Soulé
1897.70	340.1	9.09	3*n*	Doo
1898.61	340.6	8.89	3*n*	A
1901.34	339.3	9.15	3*n*	Doo
1901.40	340.6	9.18	5*n*	β
1903.20	339.6	9.45	6*n*	β
1905.28	338.0	9.84	3*n*	Doo
1905.47	339.8	9.75	4*n*	β



β 815

The measures give 0″.143 in 323°.1 for the most probable value of the proper motion of B.

For a future independent determination of the proper motion of B, I have measured a distant 11.5 m star in the line of AB:

		A and C		
1901.40	160°.7	67″.76	5*n*	β
1903.23	160.6	67.92	3*n*	β
1905.54	160.5	67.83	1*n*	β
		B and C		
1901.40	160°.5	77″.16	5*n*	β
1903.23	160.3	77.75	3*n*	β
1905.54	160.3	77.93	1*n*	β

[β (**XII**) .... β4 .... β (2957, 3048, 3142) (*Pub. L. O.* **II**) (*Sid. Mess.* **IX**, 299) (*Ast. and A.-P.* **XIII**, 18) ... En (2786) ... Com (**VI**) (*Sid. Mess.* **IX**, 78) ... Lv (*A. J.* 407) ... Soulé (*A. J.* 410) ... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**) ... A (3585) ... β5 ... β6 ...]

23m 37s **7642.** **Σ 2052.** (= **Sh 231.**) *Herculis* 71. Certainly binary, as the two stars have a common proper motion:

A. G. Berlin	0″.534 in 320°.0
Porter	0.528 in 319.7

The distance is steadily decreasing, but the motion is slow. The change will appear from the following positions:

1829.52	109°.7	2″.98	3*n*	Σ
1842.44	109.8	2.40	1*n*	Ma
1851.89	108.0	3.05	1*n*	Σ
1856.49	104.1	2.95	2*n*	Se
1858.44	104.8	2.62	3*n*	Wr
1865.55	103.2	2.99	3*n*	Se
1866.49	103.1	2.75	4*n*	Δ
1876.31	101.0	2.61	5*n*	Sp
1879.56	101.6	2.70	3*n*	Hl
1884.48	99.2	2.47	3*n*	Hl
1890.42	98.5	2.29	2*n*	Gla
1895.56	97.5	2.24	1*n*	Lewis
1901.98	93.2	1.63	6*n*	Bowyer
1903.40	91.4	1.55	3*n*	Do

[H1...Ma (*F. S.* **I**)...Ma (**X**)...Wr...Se...Se2...Du...Hd...Ra (**XXIV**)?...Flm....En (1674)....Δ (*Mem. Accad. Sci.*)....Δ (1032, 1209)....Δ (**I, II**)....Giacomelli (**III**)...WS...WS2...Gl...Sk2...Sp (2133)...Sp (**II**)...T (2991)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Per...Per (2529, 2685)...de Ball (2753)...Je (2772)...Hayn (3051)...Glasenapp (**I, III**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Knorre (3300)...Ebell (3321)...Brown (3645)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)....Boeger (*A. J.* 522)....Maw (**IV**)....Thiele (3837)....Sk5....Biesbroeck....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 507; **LXI**, 486; **LXII**, 393; **LXIII**, 403; **LXIV**, 801)...]

23 42 **7643.** **Σ 2053** *rej.* Measures by β^6. Noted as double in *A. G. Leiden.*

23 44 **7644.** **Σ 2051.** (= **H III. 102** = **Sh 230.**) Fixed.

1865.38	19°.9	13″.61	3*n*	Δ
1897.44	18.7	13.76	2*n*	Gla

[Ma (*F. S.* **I**)....Ma (**X, XI**)....H (**VII**)....Bp....Da3....Ba (**III, IV**)....WS....WS2...Gl...Glasenapp (**I, V**)...*A. G. Leipzig*, p. 209...*Annals Toulouse Obsy.* **III**...]

23 45 **7645.** **Σ 3104.** Without change.

1867.10	227°.0	8″.99	3*n*	Δ
1904.30	227.4	9.16	2*n*	β

Glasenapp measures a distant 9.1 m star:

A and DM (14°) 4436

1890.47	78°.1	107″.59	2*n*	Gla
1904.30	78.5	108.61	2*n*	β

[Ma (*F. S.* **I**)...Δ (**II**)...Cin5...Glasenapp (**I**)...β^6...]

24 7 **7646.** **Σ 2050.** Without change.

1867.20	218°.9	5″.54	3*n*	Δ
1904.24	216.7	5.46	2*n*	β

Glasenapp measures a distant 8.7 m star:

A and SD (12°) 4525

1890.44	300°.1	137″.87	2*n*	Gla
1904.23	299.3	137.89	2*n*	β

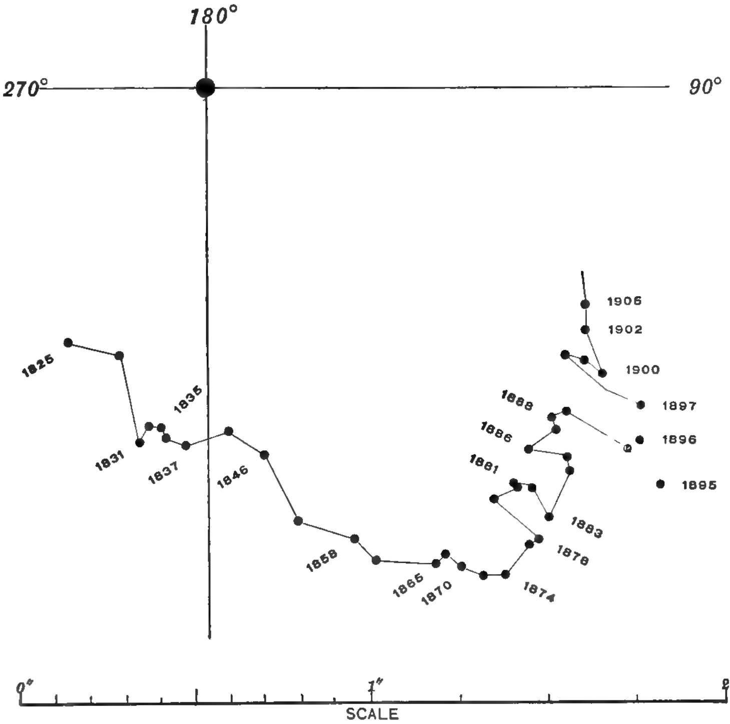
[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...Glasenapp (**I**)...β^6...]

24m 16s **7648.** φ *Ophiuchi.* **β 626.** This distant companion was noted with the 18½-inch. The principal star has a proper motion of 0″.078 in the direction of 249°.1 (Auwers), and the companion may have the same movement. Relative change is doubtful. These are all the later measures:

1892.40	35°.8	33″.40	2*n*	β
1898.30	35.5	33.59	2*n*	β
1898.41	36.7	33.38	3*n*	A
1901.43	37.3	33.66	2*n*	Doo
1904.38	36.0	33.33	3*n*	β

[β (**X**)...β1...β (3142)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...β^6...]

24 52 **7649.** λ *Ophiuchi.* **Σ 2055.** (= **H I. 83.**) Binary of long period. Nothing whatever is known concerning the orbit, and probably this uncertainty will continue for the better part of another century. The observations prior to Struve are too doubtful to be used in any investigation. The total arc described since the beginning of the Dorpat measures is only 90°, and the problem of finding the period is as indeterminate now as it was when the first orbit was computed more than fifty years ago. The varying and inconsistent results obtained by the several computors furnish sufficient evidence on this point.



λ Ophiuchi. Σ 2055

1847	Madler	89.00 yrs.	*F. S.* I, 265
1848	Hind	95.88	*A. N.* 668; *Mon. Not.* IX, 144
1872	Seeliger	122.51	Leipzig, 1872
1876	Doberck	240.95	*A. N.* 2106
1877	Doberck	233.89	*A. N.* 2126
1886	Glasenapp	373.5	*Mon. Not.* XLVIII, 254

The system has a proper motion of:

Auwers	0″097 in 215°8
Boss	0.103 in 198.6

The following 39 annual positions are shown on the diagram. It will be noticed that the distances by Σ, OΣ, and Δ are more accordant than those of later observers when the distance was larger.

1825.51	331°8	0″84	3*n*	Σ
1828.51	342.1	0.81	3*n*	Σ
1831.90	349.5	1.04	2*n*	Σ
1834.42	350.6	0.99	2*n*	Σ
1835.55	352.5	0.99	5*n*	Σ
1836.50	353.4	1.01	5*n*	Σ
1837.59	356.8	1.03	1*n*	Σ
1841.09	3.8	0.99	8*n*	OΣ
1846.52	8.9	1.07	7*n*	OΣ
1853.22	11.8	1.27	3*n*	OΣ
1858.59	18.1	1.36	4*n*	OΣ
1862.93	19.6	1.44	12*n*	Δ
1865.95	25.7	1.51	13*n*	Δ
1867.98	26.9	1.50	10*n*	Δ
1870.00	28.0	1.55	8*n*	Δ
1871.89	29.4	1.60	9*n*	Δ
1874.08	31.5	1.63	7*n*	Δ
1876.03	35.1	1.60	9*n*	Δ
1878.04	36.1	1.60	12*n*	Δ
1879.57	35.0	1.44	4*n*	Hl
1880.46	37.7	1.45	4*n*	β
1881.54	37.7	1.44	4*n*	Hl
1882.51	38.9	1.48	4*n*	Hl
1883.58	38.5	1.57	5*n*	Hl
1884.48	43.3	1.51	3*n*	Hl
1885.49	44.1	1.48	4*n*	Hl
1886.53	41.7	1.39	5*n*	Hl
1887.48	45.5	1.40	4*n*	Hl
1888.48	46.0	1.37	7*n*	Hl
1891.51	47.6	1.39	5*n*	Hl
1894.51	49.2	1.59	6*n*	Gla
1895.42	48.6	1.72	4*n*	Gla
1896.53	50.7	1.40	3*n*	Com
1896.54	50.7	1.79	3*n*	Hu
1897.45	53.7	1.54	4*n*	Gla
1898.48	53.1	1.29	5*n*	Gla
1899.46	53.8	1.34	3*n*	Coleman
1900.53	53.8	1.40	4*n*	Doo
1902.49	57.2	1.29	4*n*	Gr. Obsy.
1905.34	59.8	1.25	3*n*	β

[Ma (324, 352)... Ma (*F. S.* **I**, 265)... Ma (**IX, X, XI, XIII, XV**)... H1... H2... Mh... Bp .. J2... J3... WJ2... Bond (*Am. Acad.* **II**, 144)... Wr... K... K (1519)...Fl...Hind (*Mon. Not.* **IX**, 144)...Hind (668)...Se (1017, 1614)... Se (*Comp. Rend.* **XLVIII**, 375)...Se...Se2...Se3...Da1...Da2...Da3...Da4 ...Hd...Bru2...Ba (**II, III, IV**)...Wn (**V**)...Wn (1738)...WS...WS2...Gl... Sk...Sk2...Sk3...Sk4...Sk5...Du...Pl...Pt...Flm...Ra (**XXVII, XXVIII, XXXI**)...En (1518, 1674, 2677, 2742, 2786)... OΣ (**IX, X**)... Δ (*Mem. Accad. Sci.*).... Δ (1032, 1114, 1194, 1474, 1573, 1735, 1799, 1886, 1979, 2081, 2193).... Δ (**I, II**) .... Newcomb (*Wash. Obsns.* 1867, 1874) .... Hl (*Wash. Obsns.* 1880–86) ... Hl (**I, II**) ... Do (2106, 2126, 2198, 2242, 2433, 3023, 3680, 3931) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)(*Observatory* **II**, 210)...Sp (2133)... Sp (**I, II, II** App.)... Je (2369, 2772, 3802) ... Kustner (2584) ... de Ball (2753) ...Perry (*Eng. Mech.* **XXXVIII**, 192)...Per...Per (2529, 2685, 2748)...Hayn (3051)...T (2866, 3185)...β2...β3...Lv1...Giacomelli (**III**)...Collins (*Proc. Haverford Coll. Obsy.* 1891)....See (*Beob. Berlin*, No. 6, 1892).... Seeliger (*Zur theorie du Doppelsterne*, Leipzig, 1872)...Glasenapp (**I, II**)(*Mon. Not.* **XLVIII**, 254)...Jones (*A. J.* 312)...Maw (**I, III, IV**)...Glasenapp (**III, IV, V**) ...Searle (*A. J.* 299)... Lewis (*Mon. Not.* **LVI**, 359)... See (*A. J.* 359) ... Lv (*A. J.* 382)... Callandreau (*Bul. Ast.* **XII**, 523)... Big... Big (*Bul. Ast.* **XII**, 299)...Com (**X**)...Schwarzschild (3335)...Hu (*A. J.* 397)... Pritchett (*A. J.* 397)...Wagner (*A. J.* 410)...Soulé (*A. J.* 410)...Lehman (*Pub. A. S. P.* **IX**, 141)... Solá (3529)... Brown (3645)...Coleman (*Mem. R. A. S.* **LIII, LIV**)... Doolittle (*Pub. Flower Obsy.* **I**)... Gl (*Mon. Not.* **LXI**, 556)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Boeger (*A. J.* 522)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Biesbroeck... β6...Lohse (*Pub. Potsdam Obsy.*)...]

7650. **Hu 663.** No other measures. 24^{m} 59

[Hu (*Bul. L. O.* No. 57)...]

(See p. 1078)

7651. **Σ 3105.** Very slow motion. The measures are discordant, and indicate nothing as to the nature of the movement. 25 21

1830.91	59°4	0″40	2*n*	Σ
1835.62	57.5	0.62	1*n*	Σ
1846.39	52.6	0.55	1*n*	Ma
1870.05	53.2	0.5±	7*n*	Δ
1878.49	50.9	0.61	1*n*	β
1883.56	50.8	0.43	5*n*	En
1886.54	42.3	0.43	6*n*	Hl
1892.06	28.7	0.49	2*n*	Ho
1895.58	34.9	0.38	2*n*	Com
1898.39	41.6	0.39	2*n*	Doo
1902.08	31.6	0.47	5*n*	Bryant
1904.45	38.1	0.47	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XIII**)... Se... Se (*Comp. Rend.* **XLVIII**, 375)...Flm... En (2677)...Hl (*Wash. Obsns.* 1884)...Hl (**II**)...Pt...β1...Cin5...Cin6... Δ (**II**)....Wilson (Cin10)....LM....Sp (**II**).... Ho (3234).... Com (**X**).... Pritchett (*A. J.* 397)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXII**, 383; **LXIII**, 403)...A (3639)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

7652. **Σ 2066.** Fixed. 25 33

1867.15	58°6	4″73	3*n*	Δ
1897.52	58.0	4.94	2*n*	Gla

[Ma (*F. S.* **I**)... Δ (**II**)...Glasenapp (**V**)...]

7653. **Hu 748.** No other measures. 25 40

[Hu (*Bul. L. O.* No. 65)...]

(See p. 1078)

7654. **Sh 233.** (= σ 523 = **OΣ (App) 146.**) Without change. 25 43

1858.48	71°8	58″86	2*n*	OΣ	7.2...8.5
1874.17	71.6	58.79	3*n*	Δ	6.5...7.2
1879.23	71.7	58.99	3*n*	Doubiago	
1900.88	71.2	58.85	2*n*	β	

[Δ (**I**)...OΣ (**X**)...β5...]

7655. **Σ 2056.** (= H II. 23 = **Sh 232.**) Fixed. 25 44

1866.09	315°7	6″09	3*n*	Δ
1898.46	314.0	6.26	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se... Δ (**II**)...Sp (**II**)...Glasenapp (**I, V**)...*A. G. Leipzig*, p. 249...]

7656. **Ho 64.** Probably fixed. 25 58

1902.44	106°5	4″27	2*n*	Doo

[Ho (2778, 3234, 3558)...]

$25^{m}\ 58^{s}$ **7657.** **Ho 406.** No change.

AB	1903.25	347°.7	6″.19	3*n*	Doo	
	1904.29	351.0	6.53	2*n*	β	
AC	1903.25	21.4	26.56	3*n*	Doo	
	1904.29	22.3	26.27	2*n*	β	...11.4

[Ho (3234)...β^6...]

(See p. 1078)

26 9 **7658.** **Σ 2060.** Fixed.

1868.31	67°.4	3″.68	4*n*	Δ
1897.50	250.2	4.05	2*n*	Gla

[Ma (*F. S.* I)...Ma (**X, XIII**)...Δ (**II**)...Cin⁵...Glasenapp (**V**)...]

26 10 **7659.** From *Harvard Zones.* Noted "duplex" in *Gottingen Stern Catalog*, Schur, 1891. The only measures are:

1901.41	304°.9	6″.93	3*n*	β^5	9.0...9.1

26 18: **7660.** **H N. 3.** "An isosceles triangle of equal stars." Nothing since 1784 but the following:

AB	1903.49	47°.9	23″.37	2*n*	β^6	10.6...10.6
AC	1903.49	130.8	26.58	2*n*	β^6	...10.6

26 18 **7661.** **Σ 2057.** Fixed.

1868.01	86°.3	4″.97	4*n*	Δ	9.7...9.9
1888.38	264.5	4.97	2*n*	T	
1895.44	266.4	4.94	2*n*	Gla	9.2...9.4

[Ma (*F. S.* I)....Ma (**X, XIII**)....Se....Δ (**II**)....T (2991)....Lv (*A. J.* 407).... Glasenapp (**IV**)...Soulé (*A. J.* 410)...]

26 20 **7662.** **Ho 407.** No change.

1903.38	216°.4	14″.20	3*n*	Doo
1904.26	217.8	14.85	2*n*	β

[Ho (3234)...β^6...]

26 26 **7663.** **Σ 2058.** Unchanged.

1867.90	343°.8	1″.88	2*n*	Δ
1895.44	348.5	2.01	2*n*	Gla
1896.48	347.6	1.96	2*n*	Lv

Struve mentions a third star 12m, not measured:

1896.48	137°.7	15″.78	2*n*	Lv
1897.92	134.7	15.52	5*n*	Doo

[Ma (**X**)... Ma (*F. S.* I)... Glasenapp (**IV**)... Lv (*A. J.* 407)... Δ (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

26 27 **7664.** **Copeland.** Noted as double by Copeland (*Copernicus* III, 131) in observing a comet. Measures by Doolittle (*Pub. Flower Obsy.* I).

26 43 **7665.** **Σ 2059.** Unchanged.

1869.47	206°.7	1″.01	6*n*	Δ
1894.92	206.0	1.16	3*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Δ (**II**)...Glasenapp (**III, IV**)...]

$26^{m}\ 49^{s}$ **7667.** **H 4864.** "Triple, Classes I and II." Only this since H:

AB	1900.78	89°.6	10″.24	3*n*	β^5	9.5...12.8
AC	1900.45	137.6	13.38	2*n*	β^5	...14.5

There is a 10m star, 234°.3 : 73″.2.

27 0 **7668.** 31 *Herculis.* **β 816.** Discovered with the 15½-inch at the Washburn Observatory. Auwers gives this star a proper motion of 0″.042 in the direction of 260°.3. It is probable that the companion is moving with the primary.

These are all the later measures:

1884.89	223°.6	5″.65	3*n*	HΣ
1888.54	221.2	5.31	3*n*	Com
1892.17	224.2	5.28	3*n*	β
1898.47	221.9	5.11	2*n*	Doo
1905.41	224.2	5.20	2*n*	β

[β (**XII**)...β^4...β (3142)(*Pub. L. O.* **II**)...HΣ (**XII**)...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

27 29 **7669.** **β 817.** Discovered with the 15½-inch at the Washburn Observatory. Unchanged.

1888.48	327°.6	1″.14	3*n*	Com	8.6...8.7
1900.89	147.5	1.05	5*n*	Gr. Obsy.	
1901.52	328.8	1.16	4*n*	Doo	
1902.49	326.5	1.24	1*n*	Hu	8.6...8.8
1905.45	328.1	1.26	3*n*	Doo	8.2...8.6

[β (**XII**) .... β^4.... Com (**VI**) .... Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383) .... Hu (*Bul. L. O.* No. 44) .... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**)....]

28 5 **7670.** **Ho 552.** Fixed.

1902.33	300°.3	17″.77	3*n*	Doo

[Ho (3557)...]

28 7 **7671.** **Σ 2075.** Not measurable by Dembowski in 1865. Seen with 6-inch, but excessively difficult (1875). These are all the measures:

1833.25	309°.9	1″.16	3*n*	Σ
1845.67	314.3	1.20	1*n*	Ma
1881.29	322.6	1.28	2*n*	β
1896.60	321.0	1.15	2*n*	Lv
1897.74	315.8	1.42	2*n*	Doo

[Ma (*F. S.* I) .... Δ (1736).... β^4.... Lv (*A. J* 407) .... Doolittle (*Pub. Flower Obsy.* I)...]

28 10 **7672.** **Σ 2063.** (= **H IV. 62.**) Fixed.

1866.14	194°.6	16″.30	3*n*	Δ
1890.47	194.9	16.38	7*n*	Giacomelli

[Ma (*F. S.* I)...Ma (**IX, X**)...Se...Ra (**XXIII**)...Du...Δ (1209)...Δ (**I, II**)... Giacomelli (**III**).... Glasenapp (**IV**).... *Annals Toulouse Obsy.* **III**.... Espin (*Mon. Not.* **LXII**, 529)...]

28^m 30^s **7673.** **OΣ 313.** Later measures make the angle less, but the change is very slow. Ma (XIII, p. 135) measures this as new.

1851.94	155°8	0″88	7*n*	Ma
1869.51	152.6	0.75	4*n*	Du
1869.86	153.3	0.90	6*n*	Δ
1881.36	151.3	0.87	3*n*	β
1884.52	152.7	0.91	3*n*	Hl
1890.00	150.5	0.90	3*n*	Maw
1898.41	149.0	0.87	3*n*	Hu
1901.29	147.4	0.93	5*n*	Doo
1903.58	149.8	0.95	2*n*	Do

[Ma (**XI**, **XIII**)...Da^3...OΣ (**IX**)... Du ... Δ (**I**)... Flm ... Sp (**II**)... Per...Per (2529, 2749)...T (2899)... Cin^5... β^4... Hl (*Wash. Obsns.* 1884)... Hl (**II**)... Do (2322, 3931)...En (2678)...Maw (**I, IV**)...Big (*Bul. Ast.* **XII**, 299)...Glasenapp (**IV**) ... Brown (3645) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I, II**)...HΣ (**XII**)...Biesbroeck...]

28 33 **7674.** **Σ 2061.** Without change.

1866.53	23°9	2″58	3*n*	Δ
1898.57	22.6	2.50	2*n*	A

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...Δ (**II**)... Per... Per (2529)... Com (**VI**) ...A (3585)...]

28 36 **7675.** **Σ 2065.** Without change.

1866.59	217°2	30″72	3*n*	Δ
1898.47	216.5	31.02	2*n*	Gla

[Ma (*F. S.* **II**)...Ma (**XIII**)...Δ (**II**)... Cin^5... Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXIV**, 677)...]

28 42 **7676.** **Σ 2062.** Not seen by Dembowski in 1865. Well seen with 6-inch, April, 1874, and smaller than 10 m; not seen with same, June, 1874, and visible May, 1875. Variable? The following are all the measures since Struve:

1844.36	114°6	2″35	1*n*	Ma	
1857.00	114.5	2.11	2*n*	Se	9.5...10.2
1880.48	114.4	2.42	3*n*	β	8.5... 9.7
1900.50	112.5	2.52	2*n*	β	8.4...10.5

[Ma (*F. S.* **I**)...Δ (1736)...Se^1...β^1...β^4...β^6...]

28 49 **7677.** 32 *Herculis.* **β 818.** Discovered with the 15½-inch at the Washburn Observatory. Auwers gives the proper motion of 32 *Herculis,* 0″067 in the direction of 243°7. Change uncertain. The following are all the later measures:

1885.53	33°4	3″83	3*n*	HΣ
1889.25	36.1	3.42	3*n*	Com
1889.28	32.9	3.64	3*n*	β
1898.64	33.8	3.96	3*n*	A
1900.64	34.7	3.87	1*n*	Lewis
1905.49	34.0	3.80	1*n*	β

[β (**XII**)...β^4...β (2930)(*Pub. L. O.* **II**)...HΣ (**XII**)...Com (**VI**)... A (3585)... β^6...]

29 7 **7679.** **Σ 2064** *rej.* Nothing since Struve but this:

1905.20	130°3	69″32	1*n*	β^6

29^m 8^s **7680.** **Σ 2067.** Without change.

1867.51	298°2	2″57	3*n*	Δ
1879.31	297.0	2.39	1*n*	Cin

[Ma (*F. S.* **I**, 33, 56)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...En (2786)...]

29 11 **7681.** **H 586.** "Very beautiful." The only later observation is:

1904.44	236°9	9″40	1*n*	β^6	10...10

29 26 **7682.** Discovered by Young at the Princeton Observatory. No change. A faint new nebula in the field *f.*

1897.72	216°7	1″37	4*n*	Doo
1901.40	215.7	1.38	2*n*	β

[Young (2585)(*Sid. Mess.* **II**, 253) ... Doolittle (*Pub. Flower Obsy.* **I**)... β^5...]

29 42 **7683.** **β 356.** Discovered with the 6-inch. Without change.

1892.34	118°9	7″17	3*n*	β	8.6...11.5
1897.70	119.2	6.85	3*n*	Doo	8.9...11

[β (**VI**)....β (2062, 3142)(*Pub. L. O.* **II**)....Δ (**I**)....Doolittle (*Pub. Flower Obsy.* **I**)....]

30 3 **7684.** **H 4869.** Nothing since Herschel but the following:

1890.50	45°1	9″17	2*n*	Gla	9.9...10.0

[Glasenapp (**I**)...]

30 26 **7685.** **β 819.** Discovered with the 15½-inch at the Washburn Observatory. No change.

1888.60	231°3	1″59	3*n*	Com
1905.34	230.3	1.44	4*n*	Doo

[β (**XII**)...β^4...Com (**VI**)...]

30 28 **7686.** **Σ 2068.** Fixed.

1866.25	256°2	5″42	3*n*	Δ
1895.47	253.9	5.20	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**X, XI**)... H^1... Se... Se^2... Δ (**II**)... Glasenapp (**IV**)... *Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 529)...]

30 29 **7687.** **Σ 2077** *rej.* The only measure is:

1905.23	311°0	17″61	2*n*	β^6	9.0...10.1

31 3 **7690.** **H 1292.** The only measure is:

1890.49	245°5	22″76	2*n*	Gla	9.1...9.2

[H (**VIII**)...Glasenapp (**I**)...]

31m 9s **7691.** **β 952.** B was discovered with the 18½-inch, and in measuring that with the 36-inch the third star was added. The following are the later measures:

A and B

1892.24	146°1	3″96	3*n*	β	8.1...9.3
1898.67	144.8	3.78	2*n*	A	8.0...9.0
1900.45	143.6	3.83	3*n*	Doo	

B and C

1898.67	233°5	2″58	2*n*	A	...14.0

[β (**XIII**)...β^{3}...β (3142) (*Pub. L. O.* **II**)... A (3585)... Doolittle (*Pub. Flower Obsy.* **I**)...]

31 10 **7692.** **Hn 26.** Fixed.

1903.35	2°8	6″78	3*n*	Doo

[β^{4}...Lv^{1}...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

31 55 **7693.** **Σ 2069** ***rej.*** Measures by β^{5}. Lalande 30278.

[Espin (*Mon. Not.* **LXIV**, 680)...]

32 0 **7694.** **A. G. 204.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

32 9 **7695.** **Σ 2072.** Apparently unchanged.

1866.91	182°1	4″87	3*n*	Δ
1871.67	185.8	4.97	2*n*	OΣ

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Se...Se^{2}...OΣ (**IX**)...WS...WS^{2}... Gl...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 529)....]

32 29 **7696.** **Σ 2070** ***rej.*** This is the only measure:

1905.20	140°3	28″14	1*n*	β^{6}	8.2...10.0

32 44 **7698.** **H 4878.** The only measures are:

1879.50	359°0	8″52	2*n*	Cin	8.5...9.0
1890.50	358.9	8.89	2*n*	Gla	9.1...9.4

[Cin^{5}...Glasenapp (**I**)...]

33 8 **7699.** **β 820.** Discovered with the 15½-inch at the Washburn Observatory. The *Radcliffe Catalogue* for 1890 gives the proper motion of this star, 0″112 in the direction of 290°9. The later measures show no relative change, and therefore the movement belongs to both stars.

1888.50	233°1	4″30	3*n*	Com
1892.38	237.4	4.28	3*n*	β
1900.98	235.8	4.31	6*n*	Doo

[β (**XII**)...β^{4}...β (3142) (*Pub. L. O.* **II**)... Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

7700. **Σ 2071.** Unchanged. 33m 16s

1867°03	311°7	24″71	3*n*	Δ
1898.47	310.6	24.96	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Cin^{5}... Glasenapp (**V**) ... *A. G. Leipzig,* p. 209...]

7701. **Σ 2073** ***rej.*** The only measure of this is: 33 18

1905.19	77°5	27″32	2*n*	β^{6}	8.5...10.5

7702. **16 and 17** ***Draconis.*** **Σ 30, App. I.** (= **OΣ (App) 147.**) Relatively fixed. 17 *Draconis* is double (Σ 2078). References to all measures will be found in the note to that pair. The proper motions are given by Auwers: 33 21

16 *Draconis*	0″029 in	336°6
17 *Draconis*	0.038 in	303.7

1869.47	14°4	90″26	6*n*	Δ
1881.37	14.1	90.21	1*n*	OΣ
1902.52	14.0	90.32	2*n*	Hu

7703. **17** ***Draconis.*** **Σ 2078.** (= **H I. 4 = Sh 236.**) No material change. Distant star in Σ, 14°7 : 90″42 (1833.39). 33 23

1855.95	115°1	3″75	12*n*	OΣ
1870.65	114.7	3.64	6*n*	Δ
1885.97	112.2	3.62	2*n*	Per
1902.52	111.7	3.90	2*n*	Hu

[Ma (**XI, XIII**)... Ma (324)... Ma (*F. S.* **I**)... H^{1}... Da^{2}... Da^{3}... Wr ... Se... Du.... *Gr. Obsns.* 1840.... Ra (**XXIII, XXV**).... OΣ (**IX**).... Δ (1032).... Δ (*Mem. Accad. Sci.*)... Δ (**I, II**)... Bl (**V**)... Per... Pk... Je (2340, 2369, 2772)... Franz (2649)... Glasenapp (**I, III, IV**)... Maw (**II**)... Knorre (3632)... *Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 529)...Coleman (*Mem. R. A. S.* **LIV**...]

7705. **OΣ 314.** Without change 33 39

1867.30	234°6	3″73	4*n*	Δ
1898.40	233.4	3.64	3*n*	Hu

[Ma (**XI, XIII**).... OΣ (**IX**).... Δ (**I**).... Per.... Per (2685).... Brown (3645).... Hu (*Pub. L. O.* **V**)...]

7707. **Hu 486.** A later position is: 34 24

1903.50	138°3	1″19	2*n*	Bowyer

[Hu (*Bul. L. O.* No. 21)... Bowyer (*Mon. Not.* **LXIV**, 801)...]

7708. **Σ 2080.** The motion is rectilinear, and the change principally in distance. It will finally be a close pair. The following are all the measures: 34 26

1830.39	29°3	5″61	3*n*	Σ
1844.37	27.9	5.50	1*n*	Ma
1868.40	28.2	4.42	4*n*	Δ
1879.30	25.5	3.53	1*n*	β

1884.51	27°1	3″82	2*n*	Hl
1896.53	26.0	3.26	4*n*	Lv
1897.66	25.9	3.41	4*n*	Doo
1905.18	29.1	2.50	1*n*	β

[**Ma** (*F. S.* **I**)...**Ma** (**XI**)...Δ (**II**)...Δ (2194)...**Flm**...β^{3}...**Hl** (*Wash. Obsns.* 1884)...**Hl** (**II**)...**Lv** (*A. J.* 407)...**Doolittle** (*Pub. Flower Obsy.* **I**)...β^{6}...]

34^{m} 31^{s} **7709.** **Σ 2079.** (= **S 679**) Fixed.

1865.56	91°2	16″77	3*n*	Δ
1902.46	90.9	16.90	4*n*	Hu

[**Ma** (**XI, XIII, XV**)...**Ma** (*F. S.* **I**)...**Ra** (**XXIII**)...**H** (**V**)...**Du**...Δ (**I, II**)...Δ (1209)...**Giacomelli** (**III**)...**Per**...**Per** (2748)...**Glasenapp** (**I, V**)...*Annals Toulouse Obsy.* **III**...]

34 34 **7710.** **Σ 2076.** No material change.

1867.02	325°2	9″31	3*n*	Δ
1880.52	325.4	9.44	4*n*	Sp

[**Ma** (*F. S.* **I**)...**Ma** (**XI**)...**Hd**...**WS**...**WS**^{2}...**Gl**...Δ (**II**)...**Sp** (**II**)...]

34 41 **7711.** **36 and 37** *Herculis.* **Σ 31, App. I.** (= **H V. 72** = **Sh 234** = **OΣ (App) 148.**) Without change. Σ 2074 *rej.* is 36 *Herculis* with 11 m companion, Cl. IV. Auwers gives the proper motions:

36 *Herculis*	0″027 in 276°4
37 *Herculis*	0.039 in 255.0

1867.92	229°9	69″51	6*n*	Δ	
1904.47	230.0	69.51	2*n*	β	

B and *a* (= Σ 2074 *rej.*)

1904.47	316°0	24″02	1*n*	β	...11.5

[**Se**^{1}...**Ra** (**XXVI, XXXIV, XXXV, XXXVIII, XXXIX**)...**En**...**Schur** (2255)...Δ (**II**)...**OΣ** (**X**)...**Glasenapp** (**I, V**)...β^{6}...]

35 20 **7712.** **β 42.** Discovered with the 6-inch. Probably fixed.

1873.47	39°3	7″50	1*n*	OΣ	8.5...9.0
1892.33	41.9	7.28	2*n*	β	8.8...9.1
1898.51	40.2	7.45	2*n*	Gla	9.7...9.9
1901.44	41.1	7.27	2*n*	Doo	9.1...9.4

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3142) (*Pub. L. O.* **II**)...**WS**^{2}...**OΣ** (**X**)...Δ (**I**)...**Glasenapp** (**V**)...**Doolittle** (*Pub. Flower Obsy.* **II**)...]

35 23 **7713.** **H 587.** Probably fixed.

1880.55	301°5	16″46	1*n*	Big	8.5...12
1900.52	300.5	16.00	1*n*	Espin	
1903.32	298.6	16.30	2*n*	β	8.5...10.6

[**Big**...**Espin** (*Mon. Not.* **LXIV**, 679)...β^{6}...]

35 29 **7714.** 42 *Herculis.* **Σ 2082.** (= **H IV. 63.**) Very little change, but common proper motion:

Auwers	0″023 in 335°0
Battermann	0.047 in 301.9

1866.35	91°9	22″73	3*n*	Δ
1874.67	91.3	22.76	1*n*	OΣ
1900.71	91.1	23.74	4*n*	Espin
1905.54	92.2	23.69	3*n*	β

[**Ma** (*F. S.* **I**)....**Ma** (**XI, XIII**)....**OΣ** (**IX**)....Δ (**II**)....**Pk**....**Bl** (**V**)....**Espin** (*Mon. Not.* **LXII**, 529)...β^{6}...]

7715. **Ho 553.** No change. 35^{m} 50^{s}

1902.33	182°0	11″66	3*n*	Doo

[**Ho** (3557)...]

7717. ζ *Herculis.* **Σ 2084.** (= **H I. 36** = **Sh 237.**) One of the most rapid of the Struve binaries. As more than two revolutions have been made since his first measures, the orbit is fairly well determined. The system has a large proper motion: 36 47

Auwers	0″614 in 311°0
Bossert	0.615 in 311.8

The following orbits have been published:

1838	Madler	36.34 yrs.	*A. N.* 363
1842	Madler	31.47	*Dorpat Obsns.* IX, 192
1847	Madler	30.21	*Fixtern-System* I, 267
1847	Villarceau	36.36	*A. N.* 668
1853	Fletcher	37.21	*Mem. R. A. S.* XXII, 185
1854	Villarceau	36.71	*Comp. Rend.* XXXVIII, 218, 869
1867	Reuss	35.3	*Bul. Asso. de France* 1867
1869	Dunér	34.22	*A. N.* 1868
1869	Plummer	36.60	*Mon. Not.* XXXI, 195
1874	Flammarion	34.58	*A. N.* 1998
1880	Doberck	34.41	*A. N.* 2332
1895	See	35.00	*Evolution of the Stellar Systems*
1896	Doberck	34.53	*A. N.* 3448
1897	Doolittle	34.55	*A. J.* 460
1900	Lewis	32.4 33.9	*Mon. Not.* LXI, 74

Many of the measures are more or less uncertain, and doubtless a better result would be found by the use of only the best material.

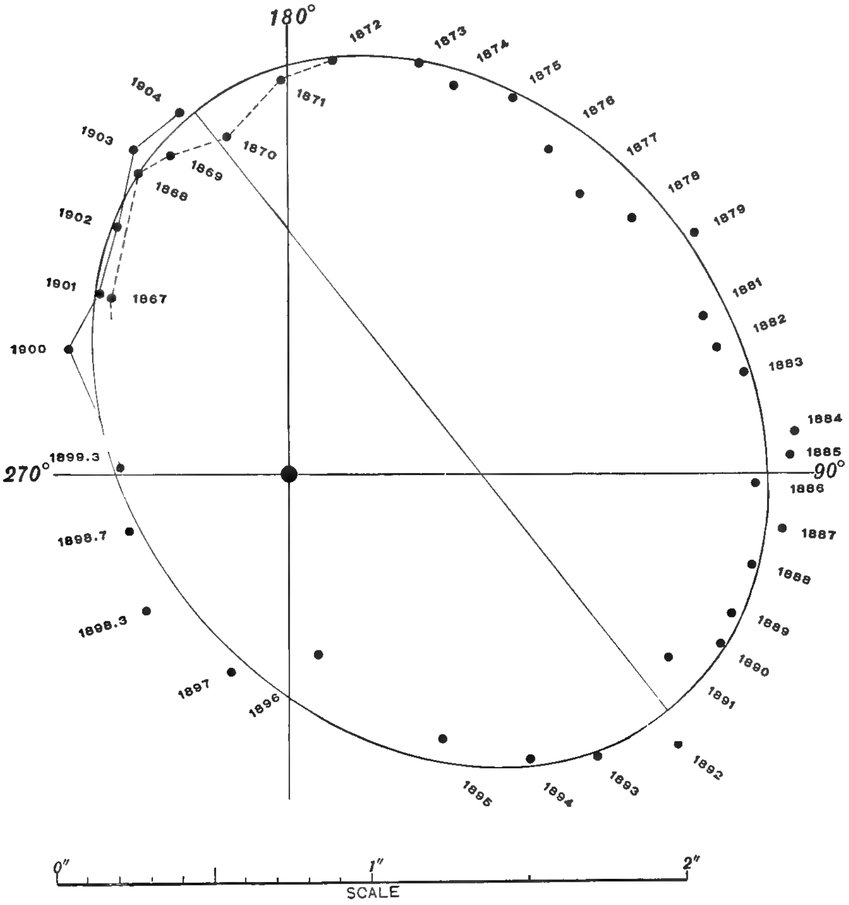
The last revolution is shown on the diagram by 39 yearly positions by some of the best observers, representing altogether measures on 294 nights.

1867	Δ	1896	Com, Lewis
1868	Δ, OΣ	1897	A
1869–75	Δ	1898.3	A
1876	Δ, Hl	1898.7	A, Lewis, Bowyer
1877	Δ, Hl	1899	A, Hu, Lewis
1878	Δ	1900	A, Lewis
1879–91	Hl	1901	A, Lewis, Bryant
1892	Com	1902	A, Bryant
1893	Sp, Big	1903	A, Doo, Biesbroeck
1894	Lewis, Big, Barnard	1904	Lohse
1895	Com		

[Σ^{1}...**Ma** (324, 363, 430, 452, 490)...**Ma** (**X, XI, XIII, XV**)...**Ma** (*F. S.* **I, II**)...**Ek** (**I**)...**Mh**...**Bp**...**Da**^{3}...**Da**^{4}...**K** (1519)...**Fl**...**Fl** (*Mon. Not.* **XXV**, 275)...**WJ**^{2}...**J**^{3}...**Da** (*Mon. Not.* **XXVII**, 90)...**Miller** (863)...**Burr** (*Mon. Not.* **XXVI**, 61)...**Miller** (*Mon. Not.* **XIII**, 223)...**Se**...**Se**^{1}...**Se**^{2}...**Se**^{3}......**Se** (975, 1614)...**Se** (*Mon. Not.* **XXVI**, 63)...**Se** (*Comp. Rend.* **XLI**, 271; **XLVIII**, 375)...**Wn** (**V**)...**Wn** (1738)...**OΣ** (**IX, X**)...**Villarceau** (668) (*Comp. Rend.* **XXXVIII**, 218, 869)...**Hd**...**Du**...**Du** (1868)...**Bru**...**Ba** (**III**)...**Ferr**...**Kn**...**Kn** (*Mon. Not.* **XXIX**, 104)...**WS**...**WS**^{2}...**Gl**...**Sk**...**Sk**^{2}...**Sk**^{3}...**Flm**....**Flm** (1998)....**Flm** (*Études et Lectures sur l'Astronomie* **VI**, 182)

(*Mon. Not.* **XXXIV**, 426)(*Comp. Rend.* **LXXXVIII**, 342)....En (1674, 2677, 2742, 2786)...Perry (*Eng. Mech.* **XXXVIII**, 192)...Newcomb (*Wash. Obsns.* 1874)...Hl (*Wash.Obsns.* 1880–86)...Hl (I, II)...Δ (*Mem. Accad. Sci.*)... Δ (1032, 1114, 1194, 1474, 1735, 1799, 1886, 1979, 2081, 2193)...Δ (I, II)...Pt... Pl...Pl (*Mon. Not.* **XXXI**, 194)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (2242, 2332, 2433, 3023, 3448, 3680, 3931).... Kustner (2584).... Per.... Per (2529, 2685, 2748)...Sp (2133)...Sp (I, II, II App.)...Sp (III)...Je (2772)... T (2866, 3185)...β^1...β^2...β^3...β^4... Ho (2978)... Reuss (*Bul. heb. de l'Asso. de France*, 1867, II, 246)...Ho (2978)...Jones (*A. J.* 312)... Maw (I, II, IV)... See (*Beob. Berlin*, No. 6, 1892)... Glasenapp (I, III, IV)... Big... Big (*Bul. Ast.* **XII**, 299)....Searle (*A. J.* 299)....Callandreau (*Bul. Ast.* **XII**, 523)...Sk^4... Belopolsky (*Ast. and A.-P.* **XIII**, 130)... Barnard (*A. J.* 447)....Everett (*Mon. Not.* **LVI**, 464).... Com (**VI, X**)....Brown (3645).... Solá (3679)...Gl (*Mon. Not.* **LXI**, 556)....HΣ (**XII**)....Campbell (*Bul L. O.* No. 20)....Salet (*Bul. Ast.* **XXII**, 108).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 800)....Lewis (*A. J.* 468)(*Mon. Not.* **LXI**, 74)...See (3314)(*A. J.* 349, 357, 378)(*Evolution of the Stellar Systems*)...A (3465, 3585, 3639)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **XV**, 218)....Doolittle (*A. J.* 416, 460, 466, 547)(*Pub. Flower Obsy.* **I, II**).... Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...β^6...]

(See p. 1078)



ζ **Herculis.** Σ 2084

36m 51s **7718.** **β 1116.** **B. A. C. 5600.** Discovered with the 12-inch. In *Scorpio;* Gould 6.8 m. See measures a 14 m star, 197°.0 : 25".42 (1897.48) 1*n*.

1897.46	355°.3	1".85	3*n*	A
1897.48	356.7	2.21	1*n*	See
1905.30	355.3	2.18	3*n*	Doo

[β (**XVI**)...β (2956)...A (3465)...See (3496)...]

7719. **See 285.** Distance less in the later measures. 36m 53s

1900.45	260°.0	13".69	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...] (See p. 1078)

7720. **H 1293.** Not measured by Bigourdan and Glasenapp. 36 54

[Big...Glasenapp (I)...] (See p. 1078)

7723. **Σ 2081** *rej.* Measures by β^5. 37 4

7724. **Σ 2083.** (= **S 680.**) Fixed. 37 13

1865.98	334°.4	12".53	3*n*	Δ
1902.40	334.6	12.87	1*n*	Hu

[H^1....Ma (*F. S.* I)....Ma (**XI**)....Δ (**II**)...Cin^5.....Glasenapp (**V**)....*A. G. Leipzig*, p. 209....*Annals Toulouse Obsy.* **III**...]

7725. **Σ 2085.** *Herculis* 130. Fixed. 37 17

1866.23	309°.1	6".05	3*n*	Δ
1902.40	309.0	6.38	3*n*	Hu

[H^1...Ma (*F. S.* **I, II**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**V**)...]

37^m 21^s **7726.** **β 953.** Discovered with the 18½-inch. It was a very difficult pair with that aperture at the time of discovery, and is still more difficult since. It is a binary in rapid motion. The distance in the measure of 1898 is certainly too large. This is the *sp* of two 8 m stars; the other is 22^s *f* and 1′ 40″ *n*.

1879.27	328°.7	0″.30	1*n*	β	7.8...8.3
1891.42	302.8	0.12	1*n*	β	7.8...8.5
1892.39	298.1	0.18	3*n*	β	8.0...8.5
1898.27	265.9	0.32	1*n*	β	8.0...9.0
1899.71	223.2	0.10	1*n*	A	
1900.75	216.3	0.1 ±	1*n*	A	
1901.53	221.6	0.10	2*n*	A	

[β (**XIII**) ...β^3... β (3114, 3142) (*Pub. L. O.* **II**)... A (3585) (*Pub. A. S. P.* **XII**, 31) (*Bul. L. O.* No. 11)...]

(See p. 1078)

37 23 **7727.** **See 286.** No other measures.

[See (*A. J.* 431)...]

37 23 **7728.** **β 1199.** One of the principal stars, and near the center, of the great cluster in *Hercules* (Messier 13); discovered with the 36-inch. The close pair is No. 320 of *Scheiner's Catalogue* of the stars in M 13.

The only other measures are:

B and C

1898.54	240°.4	0″.97	2*n*	Barnard

A and B

1898.54	308°.1	2″.76	4*n*	Barnard

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...]

37 24 **7729.** **Σ 2092.** Fixed.

1866.22	5°.7	7″.96	3*n*	Δ
1878.85	4.6	8.12	1*n*	β
1905.15	5.0	8.25	2*n*	β

[Ma (*F. S.* I)... Δ (**II**)... Seagrave (*Sid. Mess.* **II**, 274)...β^1...β^3... Espin (*Mon. Not.* **LXIV**, 677)...β^6...]

37 33 **7730.** **Σ 2087.** (= **Sh 238.**) Unchanged. The proper motions from meridian observations are given (*A. G. Berlin*):

A = 0″.079 in 300°.3
B = 0.100 in 287.3

The real motion is the same for each star, as there has been no relative change since the first measures:

1867.37	290°.4	5″.74	4*n*	Δ
1889.52	288.2	5.96	4*n*	Giacomelli
1902.40	290.0	5.91	3*n*	Hu

[Ma (*F. S.* I)... Ma (**XI**)... Wr... Se... Se^2... Bp... Ra (**XXIII**)... En (1674)... Δ (I, II)... Δ (1194)... Per... Per (2748)... T (2991)... Du... Giacomelli (**III**).... Glasenapp (**IV**).... Coleman (*Mem. R. A. S.* **LIII**).... *Annals Toulouse Obsy.* **III**...]

7731. **H V. 127.** (= **Sh 235.**) Without change. The following are all the other measures: 37^m 48^s

1840.47	290°.9	53″.80	1*n*	OΣ	7.2...8.8
1881.38	291.9	53.31	3*n*	β	7.3...8.0
1886.51	292.0	53.29	3*n*	Eng	
1903.44	292.0	53.43	3*n*	β	7.3...8.3

[OΣ (**X**)...β^4... Engelhardt (2785)...β^6...]

7733. **Σ 2086.** Without change. Glasenapp measures a wide couple of faint stars in the field. 35^s *p* and 1′ *n*; 300°.6: 102″.63 : 9.3...9.5 (1890.50) 2*n*. 38 8

1866.52	157°.0	13″.76	3*n*	Δ
1879.38	156.6	13.79	2*n*	Cin

[Ma (*F. S.* **II**)... Mh... Δ (**II**)... Cin^5... Glasenapp (**I**)...]

7734. **Σ 2091.** There may be some change in the distance. 38 13

1843.21	304°.5	1″.05	2*n*	Ma
1850.29	301.8	1.25	3*n*	OΣ
1867.40	303.8	1.18	4*n*	Δ
1871.55	306.0	1.12	6*n*	Du
1885.49	303.8	1.17	4*n*	Per
1888.97	306.1	0.96	5*n*	Hl
1897.67	303.5	0.99	2*n*	Brown
1901.27	305.6	1.07	6*n*	Bryant

[Ma (*F. S.* **I, II**)... Ma (**X, XI, XIII, XV**)... Se... OΣ (**IX**)... Δ (1114)... Δ (**I, II**)... Du... Sp (**II**)... Per... Per (2748)... T (2898)... Hl (**II**)... Glasenapp (**IV**)... Brown (3645)... Greenwich Obsy. (*Mon. Not.* **LIX**. 400; **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIII**, 403)... Coleman (*Mem. R. A. S.* **LIII**)... Lohse (*Pub. Potsdam Obsy.*)...]

7735. **OΣ (App) 149.** B is W^2 XVI. 1178. No material change. 38 19

1892.62	135°.4	99″.47	3*n*	Franz
1902.24	134.9	98.99	2*n*	β

[Δ (**I**)... Franz (3464)...β^6...]

7736. **Σ 2089.** Probably no motion. 38 22

1868.29	67°.3	2″.41	3*n*	Δ
1884.51	67.1	2.59	2*n*	Hl
1897.66	62.2	2.37	4*n*	Doo
1902.39	63.1	2.46	1*n*	Hu

[Ma (*F. S.* I)... Ma (**XI**)... Δ (**II**)... Flm... Δ (2194)... Hl (**II**)... Doolittle (*Pub. Flower Obsy.* I)... HΣ (**XII**)...]

7737. **Σ 2088** *rej.* H (VII) 335°±: 50″: 6...15 (1823+). The only measures are with the 40-inch, which shows a faint companion to B: 38 40

AB	1905.21	334°.8	20″.43	2*n*	β	7.6...11.6
BC	1905.21	104.8	7.94	2*n*	β	...13.0

[H (**VII**)...β^6...]

38^m 47^s **7738.** *η Herculis.* **Σ 2093** *rej.* The principal star was thought by Struve to be a very close pair, but afterwards rejected as single in *Mensurae Micrometricae.* Later it was measured by Ma who found from three accordant observations, 155°.7 : 0″.79 (1841.39). There seems now to be no doubt that the elongation measured was not real. I have examined this star many times at intervals during the past twenty years, with apertures from 6 to 40 inches without detecting the least sign of duplicity at any time. No elongation has been suspected by anyone except Ma since Σ, and there is no longer any reason for retaining it as a close pair. The proper motion is 0″.079 in 161°.2 (Auwers).

The distant star was measured with the 18½-inch. That instrument shows a fainter star in the same direction, and about two-thirds the distance.

1901.34	262°.2	114″.27	2*n*	*β*

[Ma (430) ... Ma (**IX, X**) ... WS ... Pk... *β*3... *β*5... Belopolsky-Wagner (2888) parallax...]

39 8 **7739.** **Σ 2094.** Both companions relatively fixed. This is No. 12 of the list of new pairs in Ma (XI), but the place there given is erroneous, being nearly that of Σ 2087.

A and B

1867.97	79°.7	1″.42	4*n*	*Δ*
1886.54	77.2	1.50	2*n*	Per
1897.65	78.0	1.42	3*n*	Maw
1902.41	79.5	1.52	2*n*	Hu

AB and C

1867.97	312°.2	24″.83	4*n*	*Δ*
1899.45	312.2	24.83	1*n*	Bryant
1902.41	313.0	24.89	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**X, XI**, pp. 24, 74) ... OΣ (**IX**) ... Du... *Δ* (1209) ... *Δ* (**I, II**) .... Do (2198, 3680) (*Trans. R. I. Acad.* **XXIX**, Part 13) .... Se.... Per.... En (2677) .... T (2991) .... Glasenapp (**I, III**) .... Bryant (*Mon. Not.* **LX**, 507) .... Maw (**II, III**) ....]

39 9 **7740.** 41 *Herculis.* The two stars, A and B, have the same proper motion, and are therefore probably physically connected. The other distant star, C, does not share in this movement. The change in that star corresponds to the proper motion of A. This is given from meridian observations:

Auwers	0″.336 in 233°.4
Porter	0.341 in 224.8

The measures of C by OΣ and *β* give:

0″.332 in 224°.7

The following are the principal measures:

A and B

1854.39	191°.3	163″.65	1*n*	OΣ	
1877.52	191.1	163.29	1*n*	Doubiago	
1882.42	191.3	163.74	1*n*	OΣ	
1903.45	190.9	162.90	4*n*	*β*	...9.4

A and C

1854.39	243°.8	175″.88	1*n*	OΣ	
1882.42	244.9	167.37	1*n*	OΣ	
1903.45	245.7	160.58	4*n*	*β*	...9.5

There is a 12.5 m star within the triangle, ABC:

B*a*	1903.46	346°.4	62″.61	3*n*	*β*
C*a*	1903.46	108.4	106.00	2*n*	*β*

[OΣ (**X**) ... *β*6 ... Engelhardt (**II**) ...]

7741. **Σ 2090** *rej.* "Cl. IV and VI," in *Catalogus Novus.* 39^m 10^s Measures by *β*6. The 40-inch shows a star nearer than the Struve companions.

7742. **Σ 2099.** Without change. There is an error of 39 15 12′ Decl. in *Mens. Micr.* Not measurable in 1865 by Dembowski; companion plain with the 6-inch, 1876.

1881.48	218°.9	9″.63	3*n*	*β*

[Ma (*F. S.* **I**) ... *Δ* (1736) ... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... *β*3... *β*4 ...]

(See p. 1078)

7744. **Skinner.** (= **Hu** 312.) Found by Skinner with 39 20 the Washington Meridian Circle.

1901.62	87°.1	3″.66	3*n*	Hu

[*β*6... Boeger (*A. J.* 522) ... Hu (*Bul. L. O.* No. 12) ...]

7745. **A. G.** 205. "Multiple" in *A. G. Berlin.* This is 39 28 the planetary nebula, Dreyer 6210. The 40-inch shows a star 11 m in the center. No near companion stars.

[*β*6... Miller (*A. J.* 546) ...]

7747. 43 *Herculis.* **Sh** 239. (**H VI.** 116 = *σ* 531.) There 40 4 is no sensible change in the angle, but the distance is slowly increasing. The proper motion of the principal star from meridian positions is 0″.050 in 335°.7 (Auwers). The measures of B give 0″.023.

1852.55	230°.6	81″.90	3*n*	OΣ	4.8...9.2
1868.88	230.3	82.28	5*n*	*Δ*	5.4...8.8
1879.27	230.5	82.71	3*n*	Doubiago	
1903.40	229.9	82.51	4*n*	*β*	...9.1

[*Pos. Med.* ccxxiv ... OΣ (**X**) ... *Δ* (**I**) ... Pk... *β*6 ...]

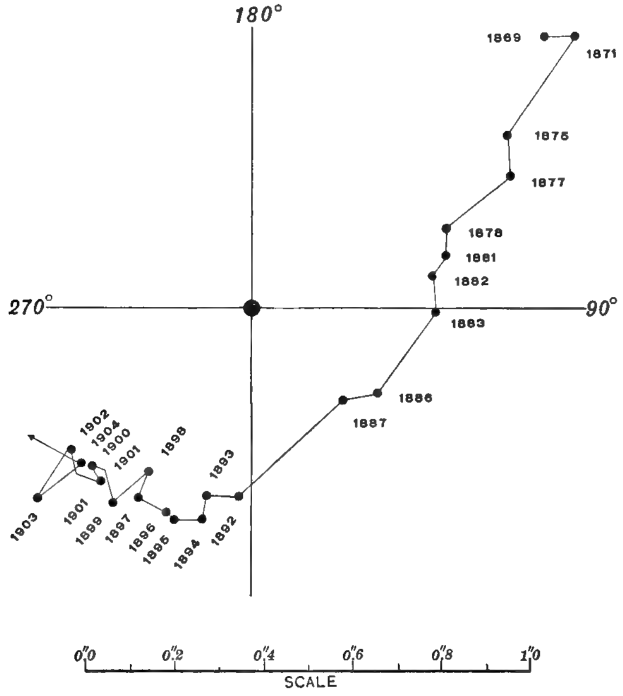
7748. *Δ* 15. Discovered by Dembowski in 1869. A 40 12 binary system. Two provisional orbits have been found:

1887	Gore	205.46 yrs.	*A. N.* 2928
1897	Evans	109	*Pop. Ast.* VII, 306

The following are all the measures:

1869.74	132°.7	0″.91	3*n*	*Δ*
1871.49	130.0	0.96	2*n*	*Δ*
1875.52	123.9	0.70	1*n*	OΣ
1877.00	116.8	0.66	4*n*	*Δ*
1878.17	112.1	0.48 ±	3*n*	Sp
1881.42	104.9	0.46	3*n*	*β*
1882.47	99.9	0.42 ±	3*n*	Sp
1883.23	101.8	0.53	6*n*	En
1883.73	88.8	0.42	6*n*	Sp
1886.67	55.8	0.35 ±	2*n*	Sp
1887.56	45.3	0.30 ±	4*n*	Sp

1892.44	355°.1	0″.59	1*n*	Wilson
1892.52	357.8	0.47	1*n*	Big
1892.56	355.8	0.40	3*n*	Com
1893.54	347.6	0.44	2*n*	Lv
1894.53	347.4	0.49	2*n*	Wilson
1895.26	339.6	0.59	3*n*	Barnard
1895.54	341.1	0.43	3*n*	Com
1895.74	340.6	0.45	1*n*	See
1896.50	339.0	0.42	2*n*	Com
1896.40	336.8	0.58	2*n*	Lv
1897.36	329.4	0.50	3*n*	A
1897.74	330.1	0.50	3*n*	Doo
1898.25	328.5	0.44	3*n*	Gr. Obsy.
1899.31	326.9	0.62	4*n*	A
1899.35	325.5	0.54	5*n*	Doo
1899.40	323.5	0.56	2*n*	Brown
1899.55	324.1	0.44	2*n*	Lewis
1900.58	315.2	0.51	3*n*	Bryant
1901.71	319.5	0.52	3*n*	Gr. Obsy.
1902.89	308.9	0.52	3*n*	Lewis
1903.48	312.2	0.64	6*n*	Doo
1904.00	312.9	0.52	5*n*	Biesbroeck



Δ 15

It is evident that there is nothing in the measures to this time to indicate anything as to the form of the apparent ellipse.

[Δ (I)...Δ (1800)...OΣ (X)...Sp (II, II App.)...Perry (*Eng. Mech.* **XXXVIII**, 192)...Flm...β 4...En (2677)...Gore (*Mon. Not.* **XLVII**, 62)...Gore (2928)...H. C. Wilson ( )...Big (*Bul. Ast.* **XII**, 299)...Barnard (*A. J.* 447)...Com (X)...See (*A. J.* 359)...Lv (*A. J.* 382, 407)...A (3465, 3639)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; LX, 507; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Evans (*Pop. Ast.* **VII**, 306)...Brown (3645)...Doolittle (*Pub. Flower Obsy.* **I, II**)...Biesbroeck...]

(See p. 1078)

7749. 46 *Herculis*. **Σ 2095.** (= **H I. 79** = **S 681.**) The principal star has a proper motion of 0″.028 in 290°.8 (Auwers). The stars are relatively fixed. 40m 19s

1868.01	163°.6	5″.07	4*n*	Δ
1902.52	162.6	5.11	2*n*	Hu

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Mh...Se...Se2...Bru...WS...WS2...Gl...Δ (1125)...Δ (I, II)...Glasenapp (**IV**)...]

7751. **Σ 2097.** Probably without change, but later observers make the angle a little less than Σ. The distant star was noted with the 6-inch. No other measures. 40 28

1867.28	86°.4	2″.01	3*n*	Δ
1878.00	85.0	1.91	4*n*	Sp
1879.30	86.0	2.02	1*n*	β
1895.46	85.2	2.11	2*n*	Gla
1900.70	84.0	2.16	3*n*	Maw

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Se...Se2...Flm...Δ (**II**)...Sp (**II**)...Cin5...β3....Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 397)....Glasenapp (**IV**)....Boeger (*A. J.* 522)...Maw (**IV**)...Biesbroeck...]

7752. **Σ 2100** *rej.* Measures by Espin (3717). 40 38

7753. **H 4887.** B is Cord. DM (28°) 12420. 40 44

1890.47	92°.1	19″.84	2*n*	Gla	9.3...9.4

[Glasenapp (**I**)...]

7754. **Hu 664.** With a later measure the mean is: 40 48

1904.34	303°.8	0″.33	3*n*	Hu	7.5...8.0

[Hu (*Bul. L. O.* No. 57)...]

7755. **H 1294.** "Large star red." Only yellow in 1900. 40 56

1900.94	131°.8	24″.99	2*n*	β5	7.0...12.5

7757. **Σ 2098.** (= **S 682.**) Unchanged. The two distant stars from S. 41 2

AB	1866.93	147°.4	14″.08	4*n*	Δ	
	1902.52	146.3	14.26	2*n*	Hu	
	1904.51	144.6	14.18	3*n*	Miller	
AC	1898.49	135.2	64.66	2*n*	Gla	...8.1

Ma (*F. S.* I)...Ma (**XI**)...H1...Δ (**II**)...Cin5...Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**]

7758. 19 *Ophiuchi*. **Σ 2096.** (= **H IV. 123** = **Sh 378.**) Fixed. The stars have a common proper motion of 0″.046 in 251°.5 (Auwers). 41 7

1865.59	91°.9	22″.33	3*n*	Δ
1879.08	91.2	22.84	3*n*	Sp
1904.47	90.9	22.62	2*n*	β

[Ma (*F. S.* I)...Ma (**XII, XIII, XV**)...Hd...Gl...WS2...Flm...Δ (**II**)...Sp (**II**)...*Annals Toulouse Obsy.* **III**...β ...]

$41^m\ 28^s$ **7759.** **Σ 2101.** Fixed.

1870.19	59°.9	4″.15	6*n*	Δ
1903.46	56.9	4.27	1*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Δ (**II**)...Sp (**II**)...Glasenapp (**I, IV**)...Cin^5...Biesbroeck...]

42 3 **7761.** **Hu 665.** With another measure the mean is:

1902.91	141°.4	2″.48	3*n*	Hu

[Hu (*Bul. L. O.* No. 57)...]

42 6 **7762.** **A 227.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

42 19 **7763.** **β 43.** Discovered with the 6-inch. Fixed.

1878.54	244°.6	0″.98	2*n*	Sp
1892.38	245.0	1.01	2*n*	β
1898.64	242.8	1.15	1*n*	Brown
1902.93	245.5	1.04	6*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3142)(*Pub. L. O.* **II**)...WS^2...Δ (**I**)...Sp (**II**)...Brown (3645)...Doolittle (*Pub. Flower Obsy.* **II**)...]

42 39 **7764.** **Weisse 31.** "Duplex 3″" in Weisse.

1901.71	136°.4	4″.55	2*n*	A	9.0...9.2

[Cin^5...A (*Bul. L. O.* No. 11)...]

43 35 **7766.** **Σ 2102.** Without change.

1868.04	275°.9	13″.60	4*n*	Δ
1904.27	276.2	13.79	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

44 2 **7768.** **Σ 2103.** Fixed.

1866.71	38°.6	5″.43	4*n*	Δ
1879.76	38.9	5.50	4*n*	Sp
1904.54	38.5	4.89	3*n*	Miller

[Ma (*F. S.* **I**)....Ma (**XI, XIII, XV**)....Se....Δ (**II**)....β^3....Sp (**II**)....En (2677)....]

44 24 **7769.** **Σ 2104.** (= **S** 683.) Fixed.

1868.88	19°.7	5″.80	5*n*	Δ
1889.52	17.9	5.69	3*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Wr...Se...Ra (**XXIII**)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Δ (1032, 1036)...Du...Per...Per (2748)...Giacomelli (**III**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

44 35 **7770.** **A. G. 206.** Noted as double in *A. G. Chris.* The only other measures are:

1898.41	164°.7	5″.82	3*n*	Doo

[β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

7773. **See 291.** A later measure is: $44^m\ 54^s$

1899.60	3°.7	2″.36	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7774. **H 4891.** Probably fixed. 45 5

1879.48	128°.0	11″.40	4*n*	Cin	9.0...9.0
1890.50	128.8	10.39	2*n*	Gla	9.8...9.9
1904.54	130.6	11.43	2*n*	Miller	9.0...9.1

[Cin^5...Glasenapp (**I**)...]

7775. **Schj 13.** No. 19 of the list of new doubles by Schjellerup, noted "oblonga?" Du and Δ found it single, as I have done on various occasions. It is certainly not a close pair. According to Bossert this star has a proper motion of 0″.143 in the direction of 155°.3. 45 8

[Schj (1485)...Du (p. 161)...]

7776. **Σ 2105.** Fixed. In the field with 21 *Ophiuchi.* 45 17

1866.43	130°.1	29″.04	3*n*	Δ
1879.50	129.1	29.19	1*n*	β
1898.50	130.3	29.11	1*n*	Solá

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...β^3...Solá (3529)...]

7777. **21** *Ophiuchi.* **OΣ 315.** There may be a little change in the angle. The components have a common proper motion: 45 20

Boss	0″.018 in 247°.0
Auwers	0.013 in 261.6

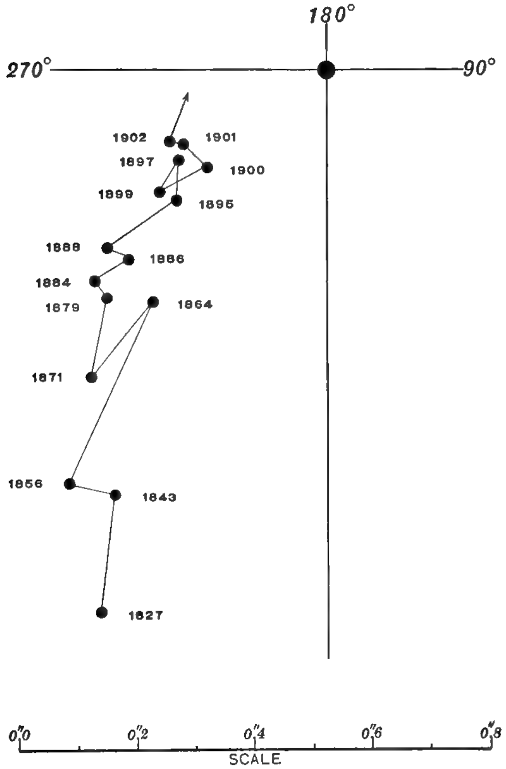
1854.46	164°.6	0″.71	4*n*	OΣ
1869.10	163.2	0.90	8*n*	Δ
1877.60	165.2	0.96	3*n*	Sp
1881.59	166.4	0.97	2*n*	β
1891.50	158.6	0.93	3*n*	Maw
1898.28	158.1	0.83	3*n*	Hu
1903.49	158.9	0.77	3*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX**)...Da^4...Se...Flm...Δ (**I**)...Do (2330)...Gl...WS...WS^2...Sk...Sp (2133)...Sp (**II**)...T (2866)...Per...Per (2529, 2685)...En (2678)...β^2...β^3...β^4...Lv^1...Wilson (Cin^{10})...Maw (**I, III**)...Big (*Bul. Ast.* **XII**, 299)...Sk^4...Solá (3529)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)....Do (3680)....Hu (*Pub. L. O.* **V**)....Biesbroeck...]

7778. **Σ 2106.** Probably a physical system, but the motion so far is practically rectilinear. The following positions are sufficient to show the relative change: 45 24

1827.31	337°.5	1″.01	5*n*	Σ
1843.18	333.6	0.82	4*n*	Ma
1856.45	328.4	0.84	2*n*	Se
1864.72	323.6	0.5±	6*n*	Δ
1871.83	322.8	0.67	3*n*	OΣ
1879.59	316.4	0.55	3*n*	Hl
1884.50	313.8	0.50	3*n*	Hl
1884.54	311.9	0.59	3*n*	Per

1886.52	313°9	0″59	4*n*	Per
1886.54	314.6	0.36	3*n*	Hl
1888.86	309.5	0.49	3*n*	HΣ
1895.30	311.5	0.37	2*n*	Barnard
1895.58	311.4	0.32	3*n*	Com
1897.29	302.1	0.30	2*n*	A
1899.38	306.7	0.36	3*n*	A
1900.55	310.0	0.27	1*n*	Bowyer
1901.70	298.4	0.28	2*n*	A
1902.51	295.5	0.30	1*n*	Lewis



Σ 2106

[Ma (*F. S.* **I**)...Ma (**X, XI**)...OΣ (**IX**)...Se...WS...WS²...Gl...Do (2307)... Δ (1474)... Δ (**II**)... Hl (*Wash. Obsns.* 1884, 1886)... Hl (**I, II**)... Hl (*A. J.* 301)...β¹...Sk...Per...Per (2685)...En (2677)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 507; **LXI**, 486; **LXIII**, 403)....Com (**X**)....A (3465, 3639)(*Bul. L. O.* No. 11)...Barnard (*A. J.* 447)... HΣ (**XII**)... Biesbroeck...]

45m 43s **7779.** 52 *Herculis.* β 627. Discovered with the 18½-inch. The principal star has a proper motion of 0″073 in the direction of 210°7 (Auwers). The measures indicate that this is common to both components, as otherwise there would be a much larger increase in the angle, with a distance of about 2″5 at the date of the measures in 1898. Bigourdan measures two 12m stars 228°6 : 67″01, and 267°6 : 143″15 (1881.42) 1*n*.

1881.42	306°5	1″76	1*n*	Big	...10
1884.23	306.2	1.99	3*n*	HΣ	
1886.33	307.6	2.03	8*n*	En	... 9.5
1892.24	318.7	1.62	3*n*	β	... 9.1
1896.49	317°3	1″82	4*n*	Lv	... 9.5
1898.61	314.5	1.90	3*n*	A	... 9.3
1900.99	317.5	1.89	6*n*	Doo	... 9.3
1903.38	321.5	1.48	1*n*	Lewis	... 9.5

[β (**X**)...β¹...β (3142)(*Pub. L. O.* **II**)(*Ast. and A.-P.* **XI**, 465)....Big....Lv (*A. J.* 407)....A (3585)....HΣ (**XII**)....Lewis (*Mon. Not.* **LXIV**, 801)....Doolittle (*Pub. Flower Obsy.* **I, II**)...]

7780. Σ 2108 *rej.* Examined under favorable conditions in 1875, and not seen double as Class I, but there is a 10m star, 360° : 20″, and this has since been measured: 46m 4s

1900.54 350°9 25″84 2*n* Espin (3717)

7782. OΣ 316 *rej.* Rejected for distance in second edition of *Poulkowa Catalogue.* No measures by OΣ. Without change. 47 4

1898.48 349°1 47″27 3*n* Hu

[Ma (**XI**)... Δ (I)...Hu (*Pub. L.O.* **V**)...]

7783. Σ 2107. *Herculis* 167. Binary. Two orbits have been published: 47 5

1879	Casey	98.5 yrs.	*A. N.* 2438
1883	Berberich	186.21	*A. N.* 2623

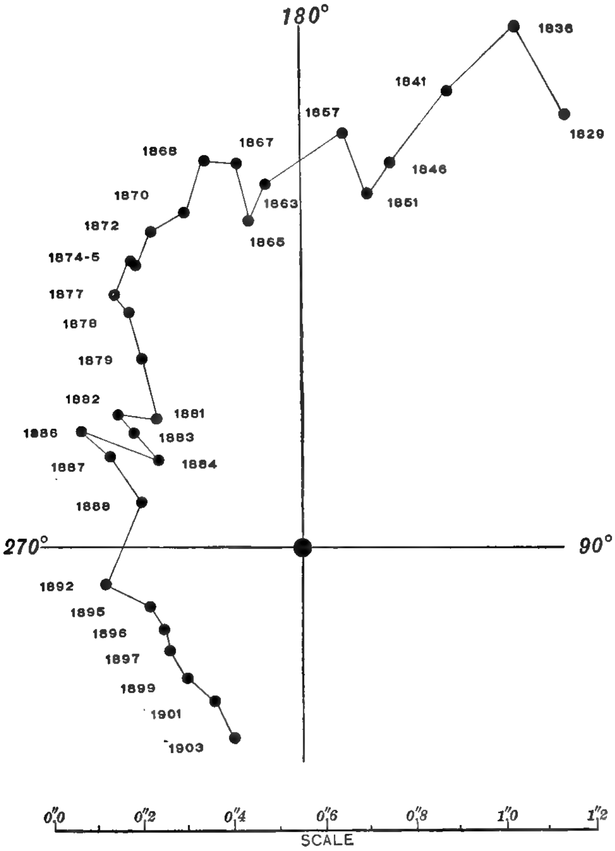
Practically the same data is used in both computations, but as the arc described at that time was less than 90°, the measures could give no indication of the apparent ellipse; and the problem is as indeterminate now as it was then, although the companion has passed over more than 180°. It is not probable that even an approximate period can be found until the companion is well into the first quadrant.

The following measures are shown on the diagram:

1829.01	148°6	1″13	3*n*	Σ
1836.54	156.4	1.26	3*n*	Σ
1841.04	162.4	1.07	4*n*	OΣ
1846.41	166.9	0.88	6*n*	Ma
1851.24	169.5	0.80	8*n*	OΣ
1857.18	174.2	0.93	5*n*	OΣ
1863.00	188.2	0.73	9*n*	Δ
1863.02	183.0	0.90	5*n*	OΣ
1865.08	189.2	0.74	12*n*	Δ
1867.11	189.5	0.87	8*n*	Δ
1868.88	194.1	0.91	8*n*	Δ
1870.84	199.2	0.79	10*n*	Δ
1872.91	205.5	0.78	9*n*	Δ
1874.25	210.3	0.73	3*n*	OΣ
1875.03	210.6	0.74	8*n*	Δ
1877.06	212.3	0.71	11*n*	Δ
1877.51	220.6	0.69	3*n*	OΣ
1878.57	216.1	0.65	4*n*	Δ
1879.59	219.9	0.55	3*n*	Hl
1881.53	228.6	0.43	2*n*	Hl
1882.51	234.0	0.50	6*n*	Sp
1883.60	235.7	0.45	7*n*	Sp
1884.78	238.5	0.37	5*n*	Sp
1886.56	242.3	0.55	4*n*	Sp
1887.51	244.6	0.47	8*n*	Sp
1888.60	254.0	0.37	2*n*	Hl
1892.60	280.2	0.44	4*n*	Com
1895.29	296.2	0.36	3*n*	Barnard

{1896.63	297°6	0″36	2*n*	Com
(1896.52	304.1	0.35	3*n*	Lv
1897.35	307.6	0.35	3*n*	A
1899.38	318.7	0.38	4*n*	A
1901.58	330.2	0.39	6*n*	A
1903.58	340.4	0.44	3*n*	Biesbroeck
1903.47	346.9	0.41	2*n*	A
1905.44	351.3	0.31	1*n*	A

The last two positions were received after the diagram was made.



Σ 2107

[Ma (*F. S.* I)...Ma (**X, XI, XIII, XV**)...Σ1...Se...Se2...Bp...Da3...K (1519) ...Hd...En (1518, 1674, 2677)...OΣ (**IX, X**)... Δ (1114, 1474, 1572, 1735, 1799, 1886, 1979, 2081, 2193)... Δ (**I, II**)... Du... Flm ... Gl... WS ... WS2... Sk... Sk2... Sk3... Pl... Kustner (2584)... Per... Per (2529)...Casey (2438)... Berberich (2623)....Hl (*Wash. Obsns.* 1881)....Hl (*A. J.* 301)....Hl (**I, II**)....Sp (2133)...Sp (**I, II, II** App)...Big...Big (*Bul. Ast.* **XII**, 299)...Sk4...Barnard (*A. J.* 447)....Com (**X**)....Lv (*A. J.* 407)....A (3465, 3639)(*Bul. L. O.* No. 11) ...Solá (3529)... Brown (3645)... HΣ (**XII**)... Sk5... Biesbroeck...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...β (*Pop. Ast.* **V**, 449)...]

(See p. 1078)

$47^m 13^s$ **7785.** **β 821.** Discovered with the 15½-inch at the Washburn Observatory. Probably unchanged.

1888.48	313°6	1″30	3*n*	Com
1901.06	312.4	1.24	7*n*	Doo
1901.39	310.0	1.36	5*n*	Lewis

[β (**XII**)... β4... Com (**VI**)... Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**)...]

7786. **β 123.** Discovered with the 6-inch. Probably fixed. In SD 8.0m. $47^m 29^s$

1886.41	205°1	1″56	1*n*	W	8.5...8.5
1892.48	203.9	1.57	3*n*	Lv	8.4...8.8
1904.44	202.2	1.44	3*n*	Doo	8.3...8.5

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59)... Cin4... Wilson (Cin10)... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Doolittle (*Pub. Flower Obsy.* **II**)...]

7787. **Ho 408.** The only later measure is the following: 47 56

1903.36	252°7	2″63	3*n*	Doo

[Ho (3234)...]

7789. **Ho 65.** Probably unchanged. 48 12

1893.54	146°5	2″22	1*n*	Ho	8...12
1903.26	154.2	2.25	3*n*	Doo	

[Ho (2778, 3234, 3558)...]

7791. **β 241.** *Ophiuchi* 74, Discovered with the 6-inch. Change is uncertain. Lalande 30725. In Gould 6.8m. 48 23

Some of the later measures are:

1878.88	345°1	0″62	2*n*	Sp	7.0...7.0
1881.55	343.0	0.65	3*n*	β	6.7...6.8
1888.56	164.2	0.6±	2*n*	Lv	7.2...7.2
1890.46	160.0	0.75	3*n*	β	7.2...7.2
1895.63	162.1	0.71	3*n*	A	7.0...7.2
1900.44	344.6	0.73	3*n*	Doo	6.8...6.9

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β3...β4...β (3048)(*Pub. L. O.* **II**)...Sp (**II**) ...Cin4...Cin5...Wilson (Cin10)...Ho (2978)...Lv1...A (*A. S. P.* **VII**, 305) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

7792. **Ku 1.** Discovered by Kustner with the Berlin Meridian Circle. The principal star has a proper motion of 0″197 in the direction of 22°7. No relative motion. 48 27

1896.51	192°7	2″90	2*n*	Lv
1903.24	189.9	2.83	3*n*	Doo

[Kustner (2756, 3821)...β (2930)(*Pub. L. O.* **II**)..Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* **II**)...]

(See p. 1078)

7794. **See 311.** The later measures are: 48 36

1900.47	130°7	2″88	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7795. **Σ 2109.** Fixed. The principal star is given a proper motion of 0″049 in 325°4 (*A. G. Berlin*). 48 37

1867.83	314°6	5″73	4*n*	Δ
1879.35	314.7	5.77	1*n*	Cin
1904.38	313.9	6.17	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Sp (**II**)...Cin5...]

7796. **Swift.** Noted by Lewis Swift in his observations of nebulae. No other measures. 48 39

[β6...]

49^{m} 17^{s} **7798.** Σ 3106. Without change. The components have a common proper motion of 0″246 in 284°1 (Bossert).

1867.20	66°3	2″19	3*n*	Δ
1882.38	63.1	2.48	1*n*	Wilson

[Ma (*F. S.* **I**)...Ma (**XIII**)...Se...Δ (**II**)...β¹...Cin⁵...Cin⁶...Glasenapp (**I**)...LM...Wilson (Cin¹⁰)...]

(See p. 1078)

49 19 **7800.** OΣ 317. Change from proper motion.

1843.65	234°1	15″39	1*n*	Ma
1874.74	226.4	16.91	1*n*	OΣ
1878.32	228.5	17.30	2*n*	β
1884.38	226.2	17.11	6*n*	En
1898.44	221.3	17.83	3*n*	Hu
1904.36	219.9	17.88	2*n*	β

There is a distant 8m star:

1874.74	318°1	113″67	1*n*	OΣ
1884.69	318.2	114.73	4*n*	En
1899.65	317.6	116.61	3*n*	Hu
1904.36	317.6	116.82	2*n*	β

[Ma (**XI, XIII**)...OΣ (**IX, X**)...Δ (**II**, p. 229)... Flm...β¹... En (2678)... Renz (*Bul. St. P. Acad.* 1892).... Engelhardt (2785) (**II**).... Hu (*Pub. L. O.* **V**)....β⁶...]

49 34 **7801.** 24 *Ophiuchi.* **β 1117.** (= **Ho 265.**) Discovered with the 12-inch. It had been previously seen by Hough, and appears in his list of new pairs subsequently published. This star has a proper motion of 0″012 in the direction of 270°0 (Auwers.) Some change in angle is probable.

1890.45	264°3	0″58	3*n*	β
1893.41	269.9	0.76	2*n*	Wilson
1893.50	270.6	0.56	2*n*	Lv
1897.47	267.2	0.62	3*n*	A
1904.49	275.8	0.56	3*n*	Doo

[β (**XVI**)...β (2956, 3048) (*Pub. L. O.* **II**)... Ho (2977)...Wilson (   )... Lv (*A. J.* 382)...A (3465)...Doolittle (*Pub. Flower Obsy.* **II**)...]

49 39 **7802.** A. G. 207. Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546).

50 1 **7803.** Sh 240. (= σ 534.) B. A. C. 5700. Probably unchanged. The distance in Sh is too large.

1856.56	230°2	5″08	1*n*	Se	
1879.01	230.9	4.84	3*n*	Cin	
1880.52	231.7	4.55	1*n*	β	6.3...8.0
1888.52	231.4	4.80	1*n*	Lv	6.0...7.3
1890.41	231.7	4.57	2*n*	Gla	6.7...7.1
1900.49	230.2	4.93	3*n*	Doo	7.3...8.4

[H (**VIII**)...J²...Se¹...Ra (**XXI, XXII**)...Cin⁴...Cin⁵...Cin⁶...Wilson (Cin¹⁰)...β³...Lv¹... Scott (*Brit. Ast. Ass'n* **V**, 75) (*Mon. Not.* **LXIV**, 52)...Glasenapp (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

50 6 **7804.** 54 *Herculis.* β 954. Discovered with the 18½-inch. There is no relative change, but it is probably a physical system, as the components have a common proper motion of 0″119 in the direction of 282°1 (Auwers).

1887.17	178°1	2″81	5*n*	HΣ
1891.27	174.9	2.56	3*n*	β
1898.47	175.8	2.73	2*n*	Doo
1904.48	173.2	3.01	3*n*	Doo
1905.40	178.2	2.64	2*n*	β

[β (**XIII**)....β³....β (3114) (*Pub. L. O.* **II**)....OΣ (**X**)....Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...β⁶...]

7805. 56 *Herculis.* **Σ 2110** *rej.* No change. The large star has a proper motion of 0″019 in 238°3 (Auwers). 50^{m} 6^{s}

1903.32	92°4	18″04	3*n*	β	...10.3

[β¹...β³...Cin⁵...β⁶...]

7806. Ho 409. The later measures are: 50 25

1903.26	19°1	8″28	3*n*	Doo
1905.52	22.0	8.64	2*n*	β

[Ho (3234)...β⁶...]

7807. H 4902. Probably fixed. 50 26

1879.81	30°4	11″04	3*n*	Cin	8.0...9.3
1904.59	31.3	10.78	3*n*	Miller	8.5...9.7

[Cin⁵...Cin⁶...]

7809. Hu 160. Later measures are: 50 44

1903.51	194°0	0″62	1*n*	Lewis
1903.68	200.2	0.70	2*n*	Biesbroeck

[Hu (*A. J.* 485)...Lewis (*Mon. Not.* **LXIII**, 403)...Biesbroeck...]

7810. OΣ 318 Fixed. 51 10

1868.90	252°5	2″54	5*n*	Δ
1898.38	250.6	2.64	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Du...Per...Per (2685)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsv.* **I**)...Boeger (*A J.* 522)...]

7813. Hn 27. No motion. 52 32

1903.36	133°5	4″54	3*n*	Doo

Doolittle measures a pair of faint stars 40^{s} *f* and 10′ *n*.

1903.26	197°2	6″28	2*n*	Doo	9.2...9.7

[β⁴...Lv¹...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7814. OΣ 319. No change in fifty years. 52 38

1868.35	63°4	0″86	5*n*	Δ
1884.44	63.7	0.91	4*n*	Per
1898.33	64.0	0.81	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)... Se... Du... Per...Per (2685)...Glasenapp (**IV**)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

7815. H 4907. Fixed. 52 38

1879.43	40°8	8″06	3*n*	Cin	8.2...8.7
1890.42	43.8	8.00	1*n*	Gla	9.1...9.3

[Cin⁵...Glasenapp (**I**)...Innes (*Southern Double Stars*, p. 309)...]

52^{m} 46^{s} **7816.** **H 1297.** The only measures are from the Kirkwood Observatory:

1904.53	48°.1	5".39	1*n*	Duncan	10...10.5

52 52 **7817.** **Σ 3107.** Probably a little change in the angle.

1831.87	112°.3	1".60	3*n*	Σ
1866.28	103.4	1.41	4*n*	Δ
1868.50	109.0	1.58	1*n*	OΣ
1875.48	106.4	1.44	1*n*	OΣ
1878.94	100.4	1.33	2*n*	β
1888.17	101.4	1.68	3*n*	HΣ
1894.57	100.5	1.44	2*n*	Gla
1898.35	97.8	1.34	6*n*	Doo
1903.42	95.6	1.35	1*n*	A

Two distant stars have been measured:

AC	1898.36	322°.2	43".17	6*n*	Doo	...11.5
AD	1890.51	42.0	76.36	2*n*	Gla	...10.3

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...OΣ (**IX**)...Se...Flm...Δ (1475, 1573)...Δ (**II**)...WS...WS²...Sk²...Pt...Lv¹...β¹...β³...Glasenapp (**I, III**)...Lv (*A. J.* 382)...Pritchett (*A. J.* 397)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Coleman (*Mem. R. A. S.* **LIII**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3931)...Biesbroeck...]

53 1 **7818.** **H 2802.** Nothing but the following since Herschel:

1900.54	123°.5	11".32	1*n*	Espin	9.3...14

[Espin (*Mon. Not.* **LXIV**, 679)...]

(See p. 1078)

53 17 **7819.** **OΣ 320.** Without change. The measure in Ma (XIII), 21°.6 : 0".55 (1845.52), evidently belongs to OΣ 321. The large star was single with the 18½-inch in 1878, and both stars round with the 36-inch in 1891. No change in the OΣ companion.

1868.24	251°.3	5".48	4*n*	Δ
1898.54	251.8	5.75	4*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Ho (3234)...Hu (*Pub. L. O.* **V**)...]

53 37 **7821.** **Ho 554.** (= **See 317.**) Later measures make the distance less.

A and B

1897.64	356°.6	9".62	1*n*	See
1900.44	356.4	9.25	3*n*	Cogshall
1903.28	357.6	9.68	2*n*	Doo

A and C

1903.28	351°.4	35".82	2*n*	Doo
1904.49	351.7	36.36	3*n*	Miller

[Ho (3557)...See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

53 42 **7822.** **Σ 2112.** Fixed.

1865.57	256°.9	2".01	3*n*	Δ
1895.51	258.5	2.28	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...Δ (**II**)...Cin⁵...Glasenapp (**IV**)...Lewis (*Mon. Not.* **LX**, 507)...]

7823. **β 1298.** (AC = **OΣ (App)** 150; CD = **Σ 2111** *rej.*) 53^{m} 49^{s} The larger star of the wide pair was found to be a close double with the 40-inch in 1901. The only other measures are:

1901.69	92°.3	0".26	3*n*	A

No other measures of CD, and only this of AB and C:

1901.70	165°.0	76".56	4*n*	β

[Δ (**I**)...β⁶...**A** (*Bul. L. O.* No. 11)...]

7824. **Ho 410.** A 13m star, 245°.5 : 29".66. 5 53

AB	1904.51	347°.4	9".07	3*n*	Doo
AC	1904.51	244.8	28.94	2*n*	Doo

[Ho (3234)...]

7825. **OΣ 321.** Probably unchanged. One measure in Ma (XIII) is called OΣ 320. 53 55

1868.48	5°.7	Obl.	5*n*	Δ
1878.46	2.6	0".55	1*n*	β
1884.44	6.6	0.67	4*n*	Per
1886.65	8.0	0.61	7*n*	En
1898.39	7.6	0.62	3*n*	Hu
1902.40	4.7	0.66	2*n*	Doo

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Se...Flm...β¹...Per...Per (2685)...**En** (2786)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7826. **Σ 2125** *rej.* Nothing since Struve but this: 53 59

1905.31	192°.3	12".47	2*n*	β⁶	8.4...9.6

7827. **H 4911.** "? if not a small companion to north." 54 10 This is the place of the 7-8m star, O. Arg. S. 16213. No companion seen with the 6-inch in 1874, and large star round. Single with 40-inch in 1901.

7828. **Σ 2116.** Probably fixed. 54 15

1867.74	5°.4	18".91	4*n*	Δ
1879.29	5.0	19.11	1*n*	β
1903.61	4.6	19.52	2*n*	Espin

[Ma (*F.S.* **II**)...Δ (**II**)...Seagrave (*Sid. Mess.* **II**, 274)...β³...Espin (*Mon. Not.* **LXIV**, 677)...]

(See p. 1078)

7830. **Σ 32, App. I.** (= **Sh 241.**) Unchanged. B is 54 34 O. Arg. N. 16677.

1869.67	263°.2	114".31	6*n*	Δ
1895.51	262.9	113.82	2*n*	Gla

[Se¹...Ra (**XXVII**)...Δ (**II**)...Je (2340)...Maiebkato (*Obsns.* 1892)...Glasenapp (**IV**)...]

$55^{m}\ 14^{s}$ **7831.** Σ 2117. Companion not seen by Dembowski in 1863. Apparently slow motion in angle. The following are all the measures:

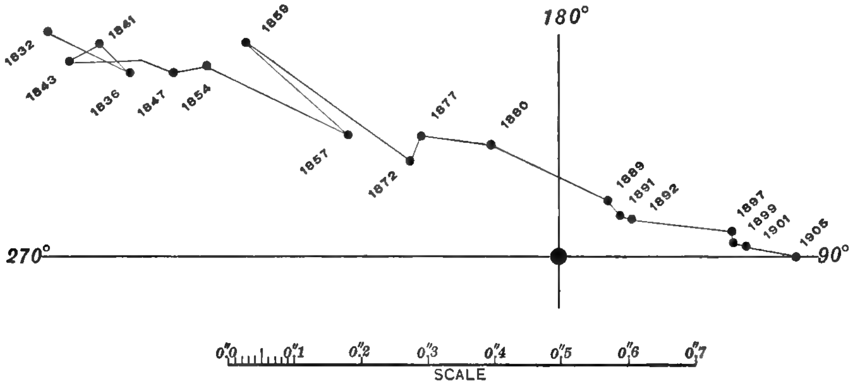
1831.53	117°0	1″36	4*n*	Σ
1843.61	113.7	1.15	1*n*	Ma
1878.30	116.3	1.29	1*n*	β
1879.34	108.4	1.36	3*n*	Cin
1896.57	106.0	1.32	2*n*	Lv
1897.68	106.3	1.37	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)... Δ (1736)... β1... Cin5... Lv (*A. J.* 407)... Doolittle (*Pub. Flower Obsy.* **I**)...]

55 34 **7832.** OΣ 322. Without change.

1871.41	201°4	1″57	7*n*	Δ
1898.42	203.1	1.53	3*n*	Hu

[Ma (**XI, XIII**)... Δ (**I**)...OΣ (**IX**)...Per...Per (2685)...Glasenapp (**IV**)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]



20 Draconis. Σ2118

55 43 **7833.** Σ 3108 *rej.* The only measures are:

1901.83 124°7 39″66 2*n* β5 8.4...9.0

55 49 **7834.** 20 *Draconis.* Σ 2118. (= Ħ I. 19.) For more than half a century after the discovery of this pair by Herschel in 1783, it was readily measurable with telescopes of moderate aperture. The distance has been slowly decreasing, and for the last twenty years it has been beyond the reach of all but the largest refractors. It may prove to be a binary system, but to this time the motion is practically rectilinear and uniform. The proper motion is given:

Auwers	0″035 in 327°8
Schroeter	0.046 in 300.2

If the relative change is due to orbital motion, the apparent orbit must be a very elongated ellipse with the plane nearly in the line of sight.

All the measures are given. Those marked (*) are shown on the diagram.

1783.26	251°5	....	1*n*	Ħ
1830.32	242.6	0″63	1*n*	H
1831.37	246.1	0.70	1*n*	H
1832.30*	246.4	0.85	5*n*	Σ
1834.57	252.0	....	1*n*	Da
1836.75*	247.0	0.71	3*n*	Σ
1840.77	242.9	....	1*n*	Da
1841.24*	245.3	0.77	3*n*	OΣ
1843.32*	248.4	0.8	1*n*	Ma
1847.71	243.3	....	2*n*	Mh
1847.97*	244.6	0.65	2*n*	Ma
1854.81*	241.7	0.61	3*n*	Da
1857.35*	240.1	0.37	3*n*	Se
1859.67*	235.7	0.58	2*n*	OΣ
1872.42*	238.0	0.27	1*n*	OΣ
1874.73	224.0	....	1*n*	Newcomb
1877.13*	229.4	0.28	3*n*	Δ
1880.82*	211.3	0.20	4*n*	β
1889.45*	140.7	0.11	3*n*	β
1891.33*	125.6	0.11	3*n*	β
1892.39*	118.3	0.12	3*n*	β
1897.34	(22.2)	0.18	1*n*	Lewis
1897.55*	98.2	0.26	3*n*	A
1899.53	(27°4)	0″18	1*n*	Bryant
1899.57*	94.7	0.26	2*n*	A
1900.73	93.2	0.16	1*n*	Bryant
1901.52*	93.5	0.28	1*n*	A
1901.62	95.5	0.15	3*n*	Bryant
1903.42	89.1	0.13	1*n*	Bryant
1903.52	89.9	0.24 ±	2*n*	Biesbroeck
1905.57*	90.1	0.35	2*n*	A

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H1...H2...Bp...Da3...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Flm...OΣ (**IX**)...Mh... Δ (1736, 2195)... Δ (**II**)...Du...WS ...Gl...Sk2...Per...Per (2529)...T (2991)... Newcomb (*Wash. Obsns.* 1874) ...En (2677, 2742)...β3...β4... β (2957, 3114)(*Pub. L. O.* **II**)(*Mon. Not.* **LI**, 459)...A (3465, 3639)(*Bul. L. O.* No. 11)...Greenwich Obsy. (*Mon. Not.* **LIX**, 416; **LX**, 507; **LXI**, 486; **LXII**, 383; **LXIV**, 801)...Biesbroeck...]

7835. β 955. Discovered with the 18½-inch. It is 11′ *s* of ε *Ursae Minoris*, and $2^{m}\ 27^{s}$ *p*. $55^{m}\ 50^{s}$

These are all the other measures:

1891.32	352°0	0″64	3*n*	β
1898.63	351.0	0.76	3*n*	A
1903.02	351.8	0.72	6*n*	Doo

[β (**XIII**)... β3... β (3114)(*Pub. L. O.* **II**)... A (3585)... Doolittle (*Pub. Flower Obsy.* **II**)...]

56^{m} 6^{s} **7836.** **Σ 2115.** *Herculis* **192.** (= **♅ IV. 122.**) Probably unchanged.

1783.23	244°9	21″05	1*n*	♅
1830.70	238.4	19.13	4*n*	Σ
1867.16	237.3	18.65	4*n*	*Δ*
1878.38	238.5	18.88	1*n*	β
1882.54	237.1	18.81	2*n*	Sp
1883.41	238.1	18.76	5*n*	En
1903.31	237.8	18.83	2*n*	β

[Ma (**X, XI, XIII, XV**)... Ma (*F. S.* **I**)... *Δ* (**II**)... Sp (**II**)...β^{1}... En (2677)... β^{6}...]

56 13 **7837.** **Σ 2114.** Slow motion in angle, but the nature of the change cannot be inferred from the measures.

1830.97	135°7	1″33	7*n*	Σ
1841.81	145.2	1.20	4*n*	OΣ
1842.92	143.4	1.21	8*n*	Ma
1856.84	145.2	1.26	3*n*	Se
1866.05	147.8	1.26	5*n*	*Δ*
1872.00	155.2	1.43	2*n*	OΣ
1879.59	155.9	1.29	2*n*	Hl
1884.51	156.0	1.31	3*n*	Hl
1884.54	157.1	1.28	4*n*	Sp
1888.58	155.7	1.36	7*n*	HΣ
1894.51	159.6	1.29	1*n*	Lewis
1896.05	160.4	1.27	6*n*	Com
1903.43	162.2	1.21	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)... Ma (324)... H^{1}... H^{2}... Mh... Wr... Da^{3}... Se... Se^{2}... Du... Flm... OΣ (**IX**)... *Δ* (1114, 1474)... *Δ* (**I, II**)... Do (*Trans. R. I. Acad.* **XXIX**, Part 13).... Do (2198).... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)... WS... WS^{2}... Gl... Sk... Sk^{3}... Giacomelli (**III**)... Per ... Per (2529, 2685, 2748)... En (2677)... T (2898)... Glasenapp (**I, III**)... Maw (**II, IV**).... Big (*Bul. Ast.* **XII**, 299).... Com (**X**).... Solá (3529).... Coleman (*Mem. R. A. S.* **LIII**)... *A. G. Leipzig*, p. 249... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**).... Je (3802).... Thiele (3837).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 507; **LXII**, 383; **LXIII**, 403; **LXIV**, 801).... Biesbroeck...]

56 19 **7838.** **Σ 2113.** Probably unchanged.

1867.28	119°1	4″87	4*n*	*Δ*
1895.56	120.0	5.20	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Se... *Δ* (**II**)... Glasenapp (**IV**)...]

(See p. 1078)

56 41 **7840.** **Howe 38.** The only complete measure is:

1901.44	177°4	6″18	2*n*	β	8.7...12.7

[Cin^{5}...β^{5}...]

56 54 **7841.** **H 262 and 263.** "In the same field." The only measures are of H 263:

1900.52	113°3	18″04	1*n*	Es	9.3...11.5
1904.53	113.1	19.77	3*n*	Miller	9.5...10.8

[H (**VII**)... Espin (*Mon. Not.* **LXIV**, 679)...] (See p. 1078)

57 26 **7843.** **Ho 411.** The *s* star of a small triangle.

1903.36	258°7	2″03	3*n*	Doo

[Ho (3234)...]

7845. **33 and 34** *Ophiuchi*. In *Hercules* by B. A. C., Nos. 5753, 5757. Change from proper motion (Auwers): 58^{m} 7^{s}

A = 0″072 in 255°6
B = 0.134 in 185.6

1866.55	115°6	294″62	7*n*	*Δ*
1877.44	115.8	295.59	4*n*	Je
1891.58	115.7	296.33	3*n*	Mai

[Ra (**XXVI**)... *Δ* (1574)... *Δ* (**II**)... Je (2340)... Maiebckato (*Obsns.* 1892)...]

7846. ε *Ursae Minoris.* **Hd 143.** This was suspected to be a close pair by the Harvard observers. It has never been seen double since, and probably is not double. In looking for this, the distant star was noted. These are all the later measures: 58 19

1897.58	5°5	76″56	3*n*	Doo
1904.43	5.4	76.97	2*n*	β

The principal star is supposed to be a spectroscopic binary, discovered by Campbell (*Astrophysical Jour.* X, 178). The proper motion is small, 0″017 in 93°4 (Auwers).

[β^{3}...β^{6}... Doolittle (*Pub. Flower Obsy.* **I**)...]

7847. **β 822.** *Herculis* **198.** Discovered with the 15½-inch at the Washburn Observatory. This star has a proper motion of 0″036 in the direction of 291°0 (*A. G. Berlin*) and the measures show that this is the movement of the small star. 58 40

1885.50	215°2	1″72	2*n*	HΣ
1888.50	230.9	1.81	3*n*	Com
1896.52	228.1	1.64	3*n*	Lv
1903.46	231.3	1.76	3*n*	Doo

[β (**II**)...β^{4}... Com (**VI**)... Lv (*A. J.* 407)... HΣ (**XII**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

7848. **Ho 66.** No motion. 58 46

1903.34	246°6	13″67	3*n*	Doo

[Ho (2778, 3558)...]

7849. **Σ 2124.** Fixed. 58 47

1865.57	88°3	14″77	3*n*	*Δ*
1878.98	88.4	14.97	3*n*	β

[Ma (*F. S.* **I**)... *Δ* (**II**)... Do(3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^{1}... β^{3}... Espin (*Mon. Not.* **LXIV**, 677)...]

7850. **Σ 3109.** Fixed. 58 53

1868.47	300°4	4″71	4*n*	*Δ*
1905.28	299.8	4.60	1*n*	β

[*Δ* (**II**)... Cin^{5}...β^{6}...]

7852. **Perry.** Discovered by Rev. J. J. M. Perry in 1881 with the 18-inch reflector. No change. The principal star has a proper motion of 0″052 in 183°1 (*A. G. Berlin*). 59 26

1898.03	232°9	1″73	4*n*	Doo

[β^{4}... Doolittle (*Pub. Flower Obsy.* **I**)...]

59m 28s **7853.** **Σ 2121.** Without change.

1865.99	141°5	2″80	3*n*	Δ
1879.33	140.7	2.68	1*n*	Cin

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...]

59 42 **7854.** **Σ 2119.** Without change. The principal star has a proper motion of 0″16 in 180° (Bossert).

1868.81	195°4	2″05	3*n*	Δ
1877.85	194.6	2.23	3*n*	Sp
1905.30	192.8	2.42	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X**)...H (**VIII**)...Mh...Ferguson (*Wash. Obsns.* 1863)... Hd...Δ (1194)...Δ (**I, II**)...Se...Cin^5...Sp (**II**)...Wilson (Cin^{10})...Glasenapp (**I**)...Hu (*A. J*, 397)...*Annals Toulouse Obsy.* **III**...]

59 49 **7855.** 60 *Herculis.* ♅ V. 133. (= σ 538.) The angle in ♅ appears to be too small, and the distance at that time should have been about 46″. The proper motion of the principal star is:

Auwers	0″032	in	93°6
Σ—β	0.061	in	105.4

The last value is derived from the three sets of measures in 1852, 1878, and 1903.

The following are all the measures:

1783.44	307°0	48″67	1*n*	♅	
1852.22	310.6	51.57	1*n*	Σ	5.0...11.0
1878.92	310.1	53.11	2*n*	β	5.0...10.0
1886.50	310.1	54.35	6*n*	Eng	
1903.20	309.2	54.40	3*n*	β	... 9.9

[OΣ (**X**)...β^1...β^3...Engelhardt (2785) (**II**)...β^6...]

59 52 **7856.** **β 357.** Discovered with the 6-inch. Change uncertain.

1875.56	294°7	1″15	3*n*	Δ	8.3...10.0
1876.50	298.9	1.14	1*n*	OΣ	7-8... 9+
1882.54	316.9	1.69	1*n*	OΣ	7-8...10
1885.52	295.5	1.56	2*n*	HΣ	
1891.49	302.5	1.08	3*n*	β	8.4... 9.4
1895.50	302.5	1.31	3*n*	A	8.2... 9.4
1896.51	298.0	1.20	3*n*	Lv	8.0... 9.3
1896.53	300.0	0.99	2*n*	Lewis	
1901.37	295.1	1.04	6*n*	Gr. Obsy.	
1902.96	301.7	1.04	4*n*	Doo	

[β (**VI**)...β (2062, 3114) (*Pub. L. O.* **II**)...Δ (**I**)...OΣ (**X**)...HΣ (**XII**)...A (*A. S. P.* **VII**, 305)...Lv (*A. J.* 407)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 507; **LXII**, 383; **LXIII**, 403)...Doolittle (*Pub. Flower Obsy.* **II**)...]

59 59 **7857.** **Ho 555.** No change.

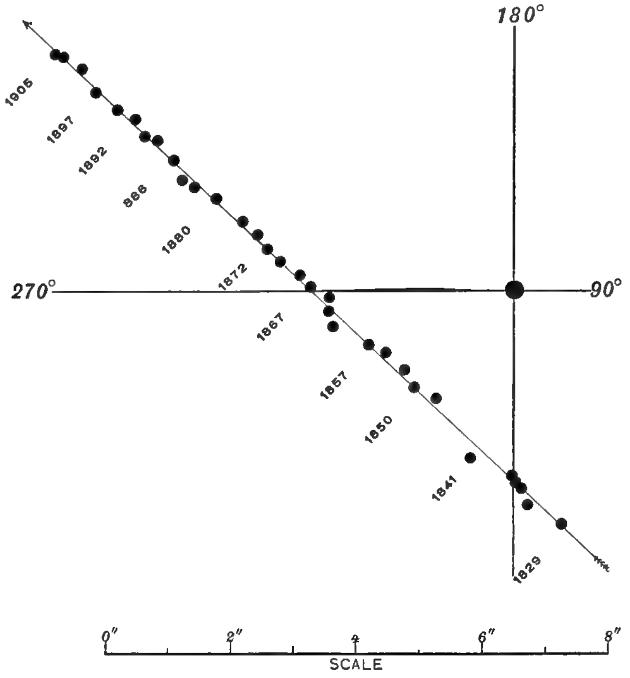
AB	1904.49	182°3	0″88	3*n*	Doo
AC	1904.50	30.5	53.99	3*n*	Doo

[Ho (3557)...]

0 0 **7858.** **Σ 2120.** *Herculis* 210. (= ♅ III. 89.) Change from proper motion. The measures give 0″146 in the direction of 47° for the annual movement of A. The stars are now separating, the minimum distance of 2″2 having been reached about 1851.

The following measures are shown on the diagram:

1829.60	11°4	3″83	2*n*	Σ
1833.28	3.6	3.47	5*n*	Σ
1835.29	1.8	3.21	7*n*	Σ
1836.55	0.2	3.10	4*n*	Σ
1837.74	359.3	3.00	3*n*	Σ
1841.12	345.8	2.83	2*n*	OΣ
1847.57	324.6	2.19	3*n*	OΣ
1850.00	314.6	2.25	3*n*	OΣ
1851.97	306.9	2.19	3*n*	OΣ
1855.10	296.5	2.29	2*n*	OΣ
1857.12	290.7	2.49	2*n*	OΣ
1861.63	281.5	2.97	1*n*	OΣ
1863.04	276.8	3.01	10*n*	Δ
1865.09	272.9	2.98	10*n*	Δ
1867.04	269.3	3.26	9*n*	Δ
1868.93	266°1	3″46	7*n*	Δ
1870.95	263.0	3.77	8*n*	Δ
1872.97	260.5	4.02	8*n*	Δ
1874.99	258.1	4.21	8*n*	Δ
1877.01	255.9	4.52	8*n*	Δ
1880.08	253.0	4.99	4*n*	Hl
1881.90	252.0	5.40	5*n*	Hl
1884.05	251.5	5.61	6*n*	Hl
1886.17	249.1	5.84	6*n*	Hl
1888.55	247.2	6.19	3*n*	Hl
1891.30	247.2	6.43	3*n*	HΣ
1892.59	245.6	6.67	3*n*	Com
1895.52	245.5	7.00	2*n*	Com
1897.58	244.5	7.45	3*n*	Gla
1900.61	242.8	7.80	3*n*	Doo
1902.53	242.4	8.16	3*n*	Gr. Obsy.
1905.20	242.3	8.27	5*n*	β



Σ 2120

In 1883 Perrotin thought the large star was a close pair. It was certainly single in 1890 with the 36-inch, and has not been seen elongated since.

[Ma (*F. S.* I)... Ma (**IX, X, XI, XIII, XV**)... Σ^1... Wr... Bp... Da^3... Se... Se^2 ... Ra (**XXX, XXXIV**)... Ba (**II, III, IV**)... K (1519)... Kn... WS... WS^2... Gl... Sk... Sk^3... Pl... Du... Du (*Stock. Akad. Of.* 1873)... Hd... Flm... Flm (*Études et Lectures sur l'Astronomie* **VI**)... Bru^2... OΣ (**IX, X**)... OΣ (*Bul. Acad. Sci.* St. Petersburg, **V**)... En (1518, 1674, 2677)... Pt... Giacomelli (**III**) ... Do (2198, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Sp (2133)... Sp (**I, II**) ... Δ (1194, 1474, 1573, 1735, 1799, 1888, 1979, 2081, 2193)... Δ (**I, II**)... Per... Per (2529, 2748)... T (2898)... Hl (*Wash. Obsns.* 1880–86)... Hl (*A. J* 301)... Hl (**I, II**)... Jones (*A. J.* 312)... β (3048) (*Pub. L. O.* **II**)... Maw (**I**)... Big... Big (*Bul. Ast.* **XII**, 299).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXIII**, 403)... Searle (*A. J.* 299)... Collins (*A. J.* 378)... Com (**X**)... See (*A. J.* 359)... Hu (*A. J.* 397)... Pritchett (*A. J.* 397)... Glasenapp (**IV, V**)... Coleman (*Mem. R. A. S.* **LIII**)... Doolittle (*Pub. Flower Obsy.* **I**)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Thiele (3837)... Biesbroeck... β^6...]

0^m 8^s **7859.** **Σ 2126** *rej.* The only measure is:

1905.20	135°3	22″85	1*n*	β^6	9.0...9.5

0 16 **7860.** **H 4919.** Measured at the Kirkwood Observatory:

1904.54	260°1	22″25	3*n*	Miller	9.0...10.7

0 20 **7861.** **Σ 3110.** Fixed.

1868.04	335°2	7″83	4*n*	Δ
1905.41	335.0	7.79	1*n*	β

[Ma (*F. S.* I)... Δ (II)... Cin^5... β^6...]

0 29 **7863.** **β 823.** Discovered with the 15½-inch at the Washburn Observatory. Direct angular motion is clearly shown. The following are all the measures:

1881.39	353°9	1″04	4*n*	β
1888.41	357.1	1.19	3*n*	Com
1888.52	358.2	....	1*n*	Lv
1889.48	359.8	1.17	3*n*	β
1893.43	1.4	1.15	3*n*	Wilson
1895.67	6.4	0.85	3*n*	A
1895.71	3.3	0.97	5*n*	Sp
1896.49	5.3	0.95	3*n*	Lv
1900.98	11.6	1.10	2*n*	Lewis
1903.46	11.8	1.03	3*n*	Doo
1903.51	13.1	0.98	2*n*	Biesbroeck
1903.51	13.6	0.95	3*n*	β

[β (**XII**)... β^4... β (2957) (*Pub. L. O.* **II**)... Com (**VI**)... Lv^1... Lv (*A. J.* 407)... Wilson (   )... A (*A. S. P.* **VII**, 305)... Sp (**III**)... Lewis (*Mon. Not.* **LX**, 508; **LXIII**, 403)... Biesbroeck... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**) ... β^6...]

0 31 **7864.** **H 2804.** These are all the measures since H:

1880.48	280°4	17″25	2*n*	Big	9.7...10.1
1900.53	278.3	15.44	2*n*	Espin	9.6...10.1
1902.32	277.7	15.16	2*n*	β	9.5... 9.6

[Big... Espin (3717)... β^5...]

7865. **Σ 2122.** *Ophiuchi* 124. Unchanged. 0^m 39^s

1866.40	279°9	20″29	3*n*	Δ
1897.59	279.2	20.59	2*n*	Coleman

[Mh... Ma (*F. S.* **II**)... Δ (**II**)... β^1... Cin^5... Glasenapp (**I**)... Solá (3529)... *Annals Toulouse Obsy.* **III**... Coleman (*Mem. R. A. S.* **LIV**)...]

7866. **Σ 2123.** Unchanged. 1 7

1865.65	218°2	18″92	3*n*	Δ
1895.50	217.6	18.96	2*n*	Gla

[Ma (*F. S.* **I, II**)... Ma (**XI, XIII**)... Δ (**II**)... Sp (**II**)... Cin^5... Glasenapp (**I, IV**) ... *Annals Toulouse Obsy.* **III**...]

7867. **See 319.** Later measures give: 1 9

1899.53	210°9	7″53	3*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 505)...]

7869. **OΣ (App) 151.** Change in distance. 1 15

1883.42	172°9	78″66	5*n*	Franz
1905.38	172.4	79.96	2*n*	β

There is a small star between, near B:

1905.43	359°6	18″22	1*n*	β

[Δ (I)... Franz (2649)... β^6...]

7870. **H 4922.** 1 27

1879.45	309°6	21″35	1*n*	Cin	8.5...10.5
1882.48	309.6	21.59	1*n*	W	7.0...10.0

[Cin^5.... Wilson (Cin^{10})...] (See p. 1078)

7871. **A 228.** No other measures. 1 27

[A (3784) (*Bul. L. O.* No. 16)...]

7872. **Σ 2128.** Fixed. Common proper motion: 1 43

Porter	0″466 in 301°6
Kustner	0.442 in 302.1

1866.86	53°7	11″70	3*n*	Δ
1893.81	53.6	12.21	2*n*	Eng
1897.50	52.3	12.03	2*n*	Gla
1904.50	51.1	12.18	2*n*	Duncan

[Ma (*F. S.* I)... Ma (**XI**)... Δ (**II**)... Cin^5... Engelhardt (**III**)... Glasenapp (**V**)...]

7873. **OΣ 323.** Distance increasing from proper motion. Hussey finds that the companion is moving approximately at the rate of 0″044 in 52°. 1 44

1868.06	103°7	7″61	4*n*	Δ
1874.74	106.9	7.85	1*n*	OΣ
1882.54	101.2	8.02	1*n*	OΣ
1897.65	96.2	8.35	3*n*	Doo
1898.44	95.9	8.28	3*n*	Hu
1905.25	92.8	8.37	2*n*	β

[Ma (**XIII**)... OΣ (**IX, X**)... Δ (**I**)... Flm... Big... En (2678)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)... β^6...]

2^m 7^s **7874.** **H 4923.** The later measures appear to show change in angle and distance.

1879.45	168°.2	7″.31	3*n*	Cin	8.3...10.3
1890.45	166.1	8.08	2*n*	Gla	7.9... 9.6
1898.55	161.9	8.58	4*n*	Doo	8.5... 9.6
1903.51	161.6	8.90	3*n*	β	8.4...10.8

Doolittle measures another pair about 1^m *p* and 8′ *s*:

1900.54	183°.7	2″.90	2*n*	Doo	9.2...10.0

[Cin^5....Glasenapp (I)....Doolittle (*Pub. Flower Obsy.* I)....Innes (*Southern Double Stars*, p. 168)...β^6...]

2 8 **7875.** **A. G. 208.** Double, 230°: 3½″, in *A. G. Albany.* This star has only a much more distant companion. The identification is correct, and no other pair near.

1904.44	242°.3	27″.77	1*n*	β	9.0...9.2

[Cogshall (*A. J.* 554)...β^6...]

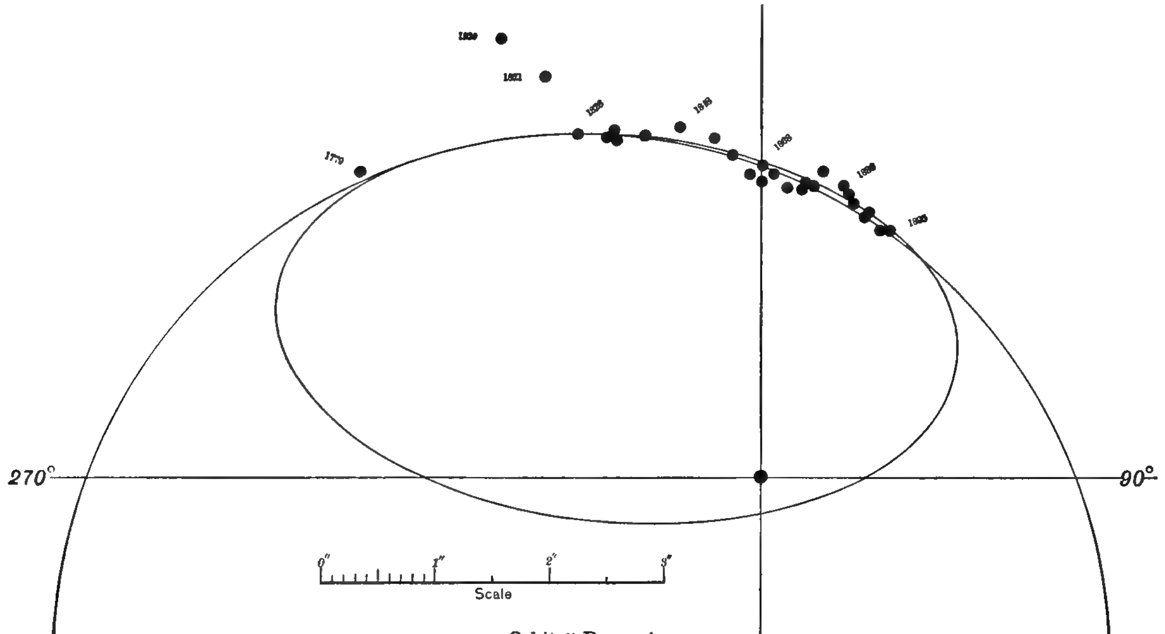
2 30 **7876.** **Σ 2127** *rej.* Bl (V), in his search for parallax, compares the principal star with another 293″ distant in the direction of 30°. The only measure of the Struve companion is from the Kirkwood Observatory:

1904.55	272°.5	17″.85	3*n*	Duncan	8.2...10.5

2 51 **7878.** *μ Draconis.* **Σ 2130.** (= **H II. 13** = **Sh 242**; BC = **β 1088**.) Discovered by Herschel in 1779, and probably a binary of very long period. The accurate measures commence with Struve in 1828, and as the angular motion since that time has been less than 70°, the form of the apparent orbit is wholly unknown. On the accompanying diagram, reproduced from *Monthly Notices R. A. S.* LVII, 547, I have shown 27 positions of the companion star (1781 to 1895), from the following observers:

1781	1*n*	H	1872	7*n*	Δ
1820	2*n*	Σ	1875	7*n*	Du
1821	1*n*	Sh	1876	3*n*	Je
1828–36 (4)	13*n*	Σ	1877	8*n*	Hl
1840	6*n*	Da	1879	3*n*	Je
1848	1*n*	Da	1883	10*n*	Per, En, Je
1855	15*n*	Δ	1885	7*n*	Hl, Per, Je
1858	3*n*	Δ	1886	3*n*	Je
1863	7*n*	Δ	1888	3*n*	Maw
1866	6*n*	Δ	1889	10*n*	β, Hl, Maw
1868	3*n*	Du	1893	7*n*	Lv, Com
1871	11*n*	OΣ, Du	1895	10*n*	See, Collins, Com

The chances are that the relative change will finally resolve itself into orbital motion; but, judging from the motion in the last hundred years, it will be a very long time before anything more than the bare fact of physical connection can be established, to say nothing about the details of that relation.



Orbit *μ* Draconis

By way of showing how easily these positions are represented by orbits wholly unlike in all respects, I have given on the diagram two of the many which could be found. So far as the observed arc is concerned, these figures are practically identical, and represent all the measures down to 1895 as well as could be desired. The ellipse with a major axis of 5″.88 gives a period of about 280 years, and the circle with a diameter of 9″.16 a period of 1190 years, the eccentricity in the one case being 0.84, and zero in the other.

The following positions will be sufficient to show the general movement in the last seventy years:

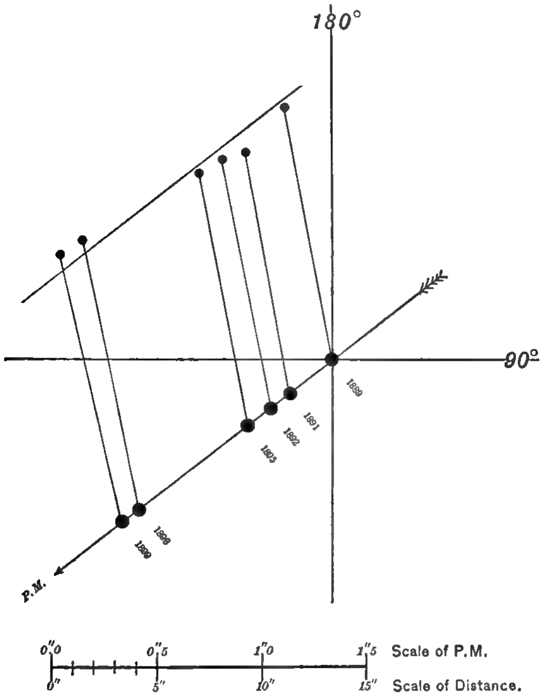
A and B

1832.22	205°.1	3″.23	9*n*	Σ
1836.79	202.8	3.27	4*n*	Σ
1854.26	188.3	3.04	11*n*	Δ

1858.23	185°.1	2″.78	3n	OΣ
1863.57	182.1	2.62	7n	Δ
1871.29	178.5	2.62	3n	OΣ
1877.42	169.7	2.64	5n	Hl
1883.63	165.0	2.66	6n	En
1889.27	159.4	2.40	4n	β
1894.66	154.6	2.39	11n	Com
1898.50	149.1	2.41	6n	Doo
1900.66	146.0	2.24	2n	Bryant
1902.68	143.5	2.22	2n	Furner
1903.73	144.2	2.17	2n	Biesbroeck
1905.58	142.2	2.24	3n	β

The following relate to the orbit:

1883	Berberich	648.0 yrs.	*A. N.* 2582
1895	Burnham	Indeterminate	*Mon. Not.* LVII, 547



Proper motion of μ Draconis and Companion

The faint star, C, was detected with the 36-inch. The bright stars, A and B, have the same proper motion, according to Auwers, of 0″.126 in the direction of 308°.2. With this movement of B, and the position of the companion from the measures of 1889, if C was fixed in space, its relation to B at the date of the measures in 1898 should be 186°.2 : 12″.83. It seems practically certain, from the measures taken together, that no such change in C has taken place, and that, therefore, the new star is a member of the physical system.

The following are all the measures of this star.

B and C

1889.27	190°.9	12″.25	3n	β
1891.30	189.7	12.20	3n	β
1892.36	191.3	12.11	3n	β
1895.28	190.8	12.36	3n	Barnard
1898.62	190°.6	12″.33	3n	A
1899.44	193.2	12.33	1n	β
1900.47	192.6	12.25	1n	β
1903.38	189.0	12.37	1n	Lewis

On the accompanying diagram the measured positions of C to 1899 from the several places of B in the line of its proper motion are shown:

[β (**XIV**)...β (2875, 2929, 3114, 3142)...β (*Pub. L. O.* **II**) (*Mon. Not.* **LVII**, 547)... Barnard (*A. J.* 447)...A (3585)...β^6...Lewis (*Mon. Not.* **LIV**, 801)...]

General references:

[Ma (*F. S.* **I**)...Ma (324)...Ma (**XI, XIII, XV**)...H^1...Mh...Wr...Wr (*Phil. Trans.* 1851)...Miller (806)...Fl...Bp...Da^1...Da^2...Da^3...Da^4...*Greenwich Obsns.* 1840...K...K (1519)...Wn (**V**)...Wn (1738)...Ba (**II, III, IV**)...Se...Se^2...Se (1614)...Ra (**XXII, XXVII, XXIX, XXXII, XLVII**)...Hd...Du...Bl (**V**)...Pl...Bru^2...Pk...Flm...WS...WS^2...Gl...Sk...Sk^3...En (1674, 2677)....Pt....Seagrave (*Sid. Mess.* **II**, 22)....Do (2092, 2198, 3023, 3931)(*Trans. R. I. Acad.* **XXVI, XXIX**)..OΣ (**IX**)...Δ (*Mem. Accad. Sci.*)....Δ (1032, 1115, 1474. 1735, 2081)....Δ (**I, II**)....Je (2369, 2772)....Goldney (2557)...Berberich (2582) orbit...Kustner (2584)...Per...Per (2529)...de Ball (2753)...T (2866)...Knorre and See (*Beob. Berlin*, No. 6, 1892)...Jones (*A. J.* 312)...*Proc. Haverford Coll. Obsy.* 1891, 1892...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)....Maw (**I, II, III**)....β (2929, 3114, 3142)(*Pub. L. O.* **II**)(*Mon. Not.* **LVII**, 547)...Searle (*A. J.* 299)...Glasenapp (**III, V**)...Big...Big (*Bul Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (**X**)...See (*A. J.* 359)...Lv (*A. J.* 382)...Morgan (*A. J.* 439)...Greenwich Obsy. (*Mon. Not.* **LX**, 508: **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Boeger (*A. J.* 522)...Espin (*Mon. Not.* **LXII**, 529)...Biesbroeck...β^6...]

7881. **Σ** 2134 *rej.* The only measures are: $3^m\ 6^s$

1904.56	147°.0	38″.1	3n	Miller	9.0...9.2
1905.76	146.8	38.02	1n	β^6	8.8...9.4

7882. **H** 264. The only later measures are: 3 26:

1900.56	197°.4	12″.54	2n	Espin (*M. N.* LXIV, 679)
1903.34	200.0	13.61	2n	β^6

7883. **OΣ** 324. No change. 3 27

1869.22	220°.1	4″.05	5n	Δ
1898.52	220.4	3.78	3n	Hu

[OΣ (**IX**)...Δ (**I**)...En (1674)...Brown (3646)...Hu (*Pub. L. O.* **V**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7884. **H** 589. "Duplex" in O. Arg. 3 28

1880.46	302°.0	9″.93	1n	β	7.5...7.8
1904.55	296.3	10.22	3n	Duncan	

[Cin^5...Cin^6...β^3...] (See p. 1078)

7885. *η Ophiuchi.* **β** 1118. Discovered with the 36-inch. As this star has a proper motion of 0″.097 in the direction of 2°.6 (Auwers), it was certain at the time of discovery that it was a binary system, since the components must be moving together, or it would have been discovered before. So far the relative motion is not as rapid as would be expected in a pair of this class. At present the retrograde movement is about 2° per annum. It is probable that the distance is very nearly maximum. 3 30

The following are all the measures:

1889.39	274°.7	0″.35	4*n*	β
1890.45	271.1	0.38	4*n*	β
1892.40	270.0	0.36	3*n*	β
1896.52	259.8	0.38	3*n*	Lv
1897.47	259.1	0.40	4*n*	A
1897.48	260.7	0.53	1*n*	See
1898.55	256.7	0.52	3*n*	β
1898.28	253.5	0.54	3*n*	A
1899.37	253.8	0.47	4*n*	A
1899.44	257.7	0.42	1*n*	Brown
1901.43	247.2	0.52	2*n*	Doo
1902.02	251.2	0.33	6*n*	Bryant
1903.53	253.1	0.48	2*n*	A
1905.47	245.5	0.48	5*n*	Doo

The following are measures of two distant stars in the field:

AB and C

1898.56	142°.5	93″.41	1*n*	β	...13

AB and D

1898.56	288°.6	99″.78	3*n*	β	...11.5

[β (**XVI**)...β (2912, 2956, 3048, 3142) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)... Lv (*A. J.* 407)....See (3496)....A (3465, 3585, 3639)....Brown (3646)....Bryant (*Mon. Not.* **LXII**, 383; **LXIII**, 403)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

$3^m\ 47^s$ **7886.** **Ho 412.** No change.

1903.33	141°.6	19″.87	3*n*	Doo

[Ho (3234)...Espin (*Mon. Not.* **LXII**, 532)...] **(See No. 13364)**

4 0 **7887.** **β 124.** Discovered with the 6-inch. Change is uncertain.

1879.37	263°.2	1″.15	1*n*	Cin
1881.42	266.3	0.94	2*n*	β
1891.71	266.8	0.94	2*n*	β
1892.64	267.9	0.85	1*n*	Sp
1902.96	258.1	0.95	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^{4}...β (3114) (*Pub. L. O.* **II**)...Δ (**I**)... WS^{2}...Cin^{5}...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

4 10 **7888.** **β 956.** This difficult pair was suspected with the 6-inch in 1873 at the time of the discovery of β 125, and referred to in the note to the latter pair. It is $3^m\ 49^s$ *p* and 8′ *s* of the well-known pair, 36 *Ophiuchi*. β 125 is 20′ *s*. These are all the other measures:

1893.49	161°.1	0″.76	1*n*	Wilson	8.0...8.5
1897.65	163.3	0.58	1*n*	See	7.5...8.5
1903.74	162.0	0.61	4*n*	Doo	

[β (**XIII**)....β^{3}....β (*Mon. Not.* **XXXIV**, 63)....See (3496)....Wilson (   ).... Doolittle (*Pub. Flower Obsy.* **II**)...]

4 27 **7889.** **A 229.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

7891. **β 125.** **B. A. C. 5789.** Discovered with the 6-inch. Further observations are necessary to show whether or not there is any relative motion. It is $3^m\ 16^s$ *p* and 28′ *s* of 36 *Ophiuchi*. β 795 is 20′ *n*. These are all the other measures: $4^m\ 43^s$

1877.42	62°.9	1″.74	2*n*	Cin
1889.47	61.3	1.48	3*n*	β
1897.65	67.1	1.65	2*n*	See
1902.95	64.6	1.57	6*n*	Doo

[β (**III**)...β ((*Mon. Not.* **XXXIV**, 59)...β^{3}...β (2957) (*Pub. L.O.* **II**)...Cin^{4}... See (3496)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7892. **A 230.** In the field with A 229. No other measures. 5 :

[A (3784) (*Bul. L. O.* No. 16)...]

7893. **Σ 2131.** (= **S 684.**) Fixed. 5 6

1866.26	178°.7	24″.36	3*n*	Δ
1895.53	178.2	24.19	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...Cin^{5}...Glasenapp (**IV**)...]

7894. **Espin 77.** The bright star has a proper motion of 0″.024 in 311°.8 (Battermann). 5 20

1903.31	272°.6	16″.82	2*n*	β	6.5...11.2

[Es (3784)...β^{6}...]

7895. **Σ 2133.** Without change. 5 39

1867.18	201°.4	3″.53	3*n*	Δ
1902.42	199.3	3.23	2*n*	Hu
1904.54	197.4	3.54	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...Cin^{5}...]

7896. **Σ 2132.** No material change. 6 26

1866.86	112°.6	1″.70	3*n*	Δ
1882.47	111.7	1.77	1*n*	Wilson

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**VIII**)...Mh...Se...Δ (**II**)...Cin^{5}...Cin^{6}... Wilson (Cin^{10})...]

7898. **Σ 2135.** Change in the angle is probable. 6 58

1856.98	170°.5	6″.86	2*n*	Se
1867.56	171.7	6.85	4*n*	Δ
1871.34	171.7	6.79	5*n*	Du
1879.24	173.7	6.93	3*n*	Sp
1885.46	174.3	7.09	4*n*	Per
1888.67	175.0	7.13	2*n*	Maw
1902.57	177.3	7.29	2*n*	Hu
1905.65	177.3	7.01	2*n*	β

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII**)...Wr...Se...Se^{2}...Flm...Du...Sk^{2}...Big ...Sp (**II**)...Δ (**II**)...Per...Per (2685, 2748)...Je (2772)...Glasenapp (**I, III**)... Maw (**I**)...Collins (*A. J.* 378)...Do (3680)...*Annals Toulouse Obsy.* **III**... HΣ (**XII**)...Boeger (*A. J.* 522)...Thiele (3837)...β^{6}...]

$7^m\ 3^s$ **7899.** **β** 1247. Discovered with the 36-inch.

1897.60	339°.6	1″.39	3*n*	A
1902.27	346.0	1.46	3*n*	Doo

[β (**XVIII**) .... β (3113) (*Pub. L. O.* **II**) .... A (3465) .... Doolittle (*Pub. Flower Obsy.* **II**) ....]

7 12 **7900.** **OΣ** 325. Probably without change.

1868.31	203°.6	1″.47	5*n*	Δ
1898.43	208.3	1.24	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (I) ... Se ... Per ... Per (2560) ... Lv¹ ... Glasenapp (**IV**) ... Brown (3646) ... Hu (*Pub. L. O.* **V**) ... Biesbroeck ...]

7 35 **7901.** **Σ** 2136. Since Part I of this catalogue was in type, Hussey has found that both components of Σ 2136 are close pairs.

A and B

1905.32	9°.5	0″.27	2*n*	Hu	8.4 ... 8.7

C and D

1905.32	83°.0	1″.11	2*n*	Hu	9.0 ... 13.5

These are all the measures of the Struve pair:

AB and C (= Σ 2136)

1831.76	114°.1	15″.64	3*n*	Σ
1843.64	114.1	15.00	2*n*	Ma
1866.12	112.9	15.63	3*n*	Δ
1879.33	112.4	16.26	1*n*	Cin
1904.54	112.9	15.55	3*n*	Miller

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin⁵ ... Hu (*Bul. L. O.* 81) ...]

(See No. 13367)

7 38 **7902.** **Barnard** 7. Discovered by Barnard at Mt. Hamilton with the 12-inch in 1891.

1895.53	148°.9	2″.06	3*n*	A
1905.33	149.8	2.29	4*n*	Doo

[β (3114) (*Pub. L. O.* **II**) ... A (*A. S. P.* **VII**, 305) ...]

7 40 **7903.** **Σ** 2138. Without change.

1866.70	137°.5	22″.35	3*n*	Δ
1895.53	136.5	22.40	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**X**) ... Δ (**II**) ... Cin⁵ ... Glasenapp (**IV**) ... *Annals Toulouse Obsy.* **III** ... Espin (*Mon. Not.* **LXII**, 529) ...]

7 54 **7904.** **Hu** 749. With a later measure the mean is:

1903.48	151°.0	1″.89	2*n*	Hu	8.6 ... 9.8

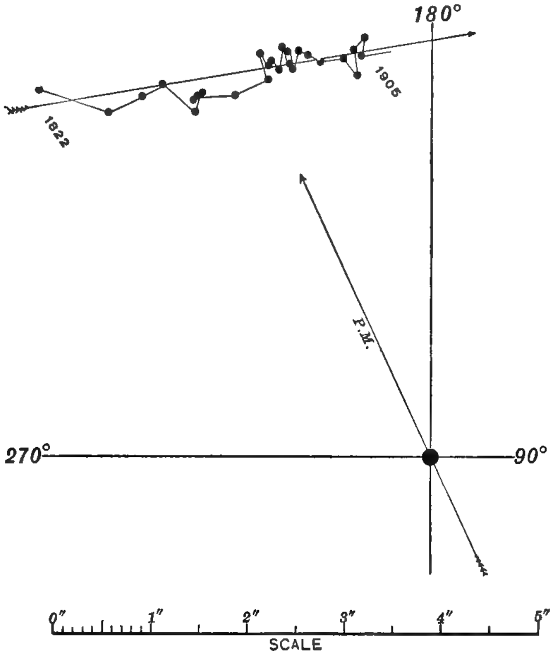
[Hu (*Bul. L. O.* No. 65) ...]

7 59 **7905.** 36 *Ophiuchi*. **Sh** 243. A system of the 61 *Cygni* type, the components having large, and nearly equal proper motions.

A = 1″.262 in 203°.2 Lynn
B = 1.326 in 202.0 Lynn
1.285 in 203.9 Porter

These stars have the same proper motion as 30 *Scorpii*, which is more than 12′ distant. That is given:

Lynn 1″.205 in 203°.0
Porter 1.247 in 204.5



36 Ophiuchi

The following positions are shown on the diagram:

1822.52	227°.3	5″.54	2*n*	Sh
1835.19	223.5	4.88	4*n*	H
1841.59	219.1	4.78	2*n*	Da
1846.21	216.1	4.74	3*n*	J
1852.34	214.6	4.31	4*n*	J
1854.69	213.0	4.44	2*n*	Wr
1856.91	212.4	4.43	3*n*	Se
1858.42	213.3	4.45	3*n*	Wr
1866.72	208.6	4.25	2*n*	Se
1875.56	203.4	4.25	6*n*	Sp
1877.00	203.1	4.51	5*n*	Hl
1877.52	202.7	4.38	4*n*	Cin
1879.20	202.0	4.41	5*n*	Sp
1879.41	201.5	4.30	6*n*	Cin
1883.08	200.0	4.49	7*n*	Hl
1883.63	200.0	4.31	6*n*	Sp
1884.47	199.6	4.41	2*n*	Wilson
1884.64	199.8	4.24	4*n*	Sp
1886.54	198.3	4.41	3*n*	Hl
1888.59	197.2	4.33	2*n*	Hl
1890.42	195.8	4.23	2*n*	Gla
1897.65	192.5	4.21	1*n*	See
1900.51	191.0	4.02	2*n*	A
1903.51	190.8	4.28	6*n*	Jouffray
1904.72	189.1	4.38	3*n*	β
1905.32	190.0	4.20	5*n*	Doo

There is a distant 8 m star, which was first measured by Sh. The change in this corresponds exactly to the proper motion of A.

AC	1823.27	289°1	180″73	1*n*	Sh
	1879.34	305.9	198.03	1*n*	β
	1890.46	311.0	204.40	2*n*	Gla
	1905.32	315.8	210.81	1*n*	β
BC	1890.46	309.9	202.45	2*n*	Gla
	1905.32	314.9	208.42	1*n*	β

The 40-inch shows a 13.5 m star near A, 298°3 : 38″6 (1904.46).

[H (**VIII**) ... H^3 ... Wr ... Mh. ... *Gr. Obsns.* 1843 ... Bp ... Da^3 ... Bond (*Am. Acad.* **II**, 144) ... P^1 ... P^2 ... WJ ... WJ^2 ... J^2 ... Se^1 ... Se^2 ... *Wash. Obsns.* 1862 ... Pl ... Hd ... Ra (**XXII, XXVIII, XXIX, XXXII, XXXIV**) ... WS ... Gl ... Flm ... Pk ... Flm (*Bul. Soc. Ast. France*, 1890, p. 73) ... Pt ... Do (2198, 3798) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Cin^3 ... Cin^4 ... Cin^5 ... Cin^6 ... Tebbutt (*Mon. Not.* **LVI**, 353; **XLVI**, 50; **L**, 23; **LIII**, 372; **LXIV**, 67) .... Sp (2133) ... Sp (**II**) ... Hl (*Wash. Obsns.* 1882–84, 1886) ... Hl (**I, II**) ... Lv^1 ... Wilson (Cin^{10}) ... Lynn (*Mon. Not.* **XXXI**, 40; **LV**, 69) ... β^3 ... Glasenapp (I) .... Scott (*Brit. Ast. Ass'n* **V**, 75) .... Searle (*A. J.* 299) .... Sk^4 .... Pritchett (*A. J.* 397) ... See (3496) ... Solá (3529) ... A (*Bul. L. O.* No. 11) ... Scott (*Mon. Not.* **LXIV**, 52) ... Jouffray (*Bul. Ast.* **XXI**, 299) ... β^6 ...]

8m 30s **7906.** **Σ 2137.** Fixed.

1867.26	144°5	4″14	4*n*	Δ
1895.46	143.9	3.98	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... Du ... Δ (**II**) ... Per ... Per (2748) ... Glasenapp (**IV**) ...]

8 31 **7907.** **β 282.** Discovered with the 18½-inch. Evidently unchanged. This star, considering its brightness, is singularly missing in some of the star catalogues covering this region. Magnitude in Lamont 5, Gould 6.3, and SD 6.4. The Cincinnati observers thought the principal star was a close pair. I have examined it many times under favorable conditions with apertures of 15½, 18½, and 36 inches, and am satisfied that it is not a close pair.

1879.81	154°8	3″94	3*n*	β	6.2...11.6
1881.42	151.7	4.41	3*n*	β	6.6...11.1
1889.42	151.9	4.31	3*n*	β	6.3...11.3
1898.50	153.0	4.33	4*n*	Hu	6.0...11.5

[β (**V**) ... β (*Mon. Not.* **XXXV**, 31) ... β^3 ... β^4 ... β (2957) (*Pub. L. O.* **II**) ... Cin^5 ... Cin^6 ... Δ (**I**) ... Hu (*A. J.* 397) (*Bul. L. O.* No. 44) ...]

8 35 **7908.** **Ho 557.** No motion.

1902.35	325°9	4″33	3*n*	Doo

[Ho (3557) ...]

8 36 **7909.** **Σ 2142.** No evidence of change.

1866.59	116°3	5″02	3*n*	Δ
1902.50	114.1	5.34	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^6 ...]

8 43 **7910.** **H. C. Wilson 14.** (AC = **H 4932.**) Close pair discovered by Wilson at Cincinnati. No motion.

A and B

1900.55	292°7	1″24	3*n*	Doo	9.5...9.8
1905.32	294.9	1.27	4*n*	Doo	

AB and C

1879.96	225°4	10″24	2*n*	Cin	8.0...10.0

[Cin^5 ... Cin^6 ... Wilson (Cin^{10}) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

7911. **Σ 2139** *rej.* This star has two distant companions, nearly the same distance, the nearest, 163°0 : 33″3 (1904.26). 8m 56s

7912. **β 957.** Discovered with the 18½-inch. Apparently without material change. 8 58

1887.74	194°5	0″4±	5*n*	Sp
1888.54	199.5	0.5±	1*n*	Lv
1889.50	201.7	0.47	3*n*	β
1905.16	192.0	0.40	6*n*	Doo

[β (**XIII**) ... β^3 ... β (2957) (*Pub. L. O.* **II**) ... Sp (**III**) ... Lv^1 ...]

7913. **Σ 2143** *rej.* Measures by β^6. 9 9

7914. *a Herculis.* **Σ 2140.** (= **H II. 2** = **Sh 244.**) There has been no change since the first measures. The principal star is variable from 3.1 to 3.9 m; the period is uncertain, the observations giving from 66.4 to 88.5 days. 9 10

It has a proper motion of 0″049 in 326°1 (Auwers).

1848.82	118°6	4″70	12*n*	OΣ
1866.54	117.8	4.65	4*n*	Δ
1879.92	115.0	4.58	12*n*	Sp
1886.66	117.4	4.68	3*n*	Hl
1896.49	113.5	4.82	3*n*	Hu
1898.52	113.9	4.68	3*n*	A
1899.47	114.5	4.75	2*n*	Gr. Obsy. (photo)
1903.46	114.7	4.62	2*n*	Biesbroeck

The faint star, C, was detected by Alvan G. Clark. The later measures are:

A and C

1889.58	334°0	23″51	2*n*	HΣ
1895.45	334.4	23.53	1*n*	Barnard
1899.52	334.8	24.07	1*n*	Gr. Obsy. (photo)

The fourth star, D, was mentioned by Mitchel. The only recent measure is:

1903.33	39°0	83″93	3*n*	β

[Ma (*F. S.* **I**) ... Ma (324, 430) ... Ma (**IX, X, XI, XIII, XV**) ... BM (280) ... Bes ... H^1 ... H^2 ... Mh ... Mu ... K ... K (409) ... Ek (**I, III**) ... Wr ... Fl ... Bp ... Da^1 ... Da^3 ... Da^4 ... Auwers (1393) ... Lu (1103) ... Lu (**I, II, III**) ... P^1 ... WJ ... WJ^2 ... J^3 ... J (*Mon. Not.* **XIII**, 241; **XIV**, 242) ... Se ... Se^3 ... Se (975) ... Se (*Comp. Rend.* **XLI**, 271) ... *Durham Obsns.* 1846–48 ... Baxendell (*Mon. Not.* **XVI**, 201) ... Wh ... Ba (**I, II, III**) ... Ra (**XXII, XXVI, XXVII, XXVIII ?, XXIX**) ... En (1518, 1674) ... Pogson (*Brit. Ass'n Rep.* 1858) ... Schmidt (1543) ... Du ... WS ... Gl ... Sk^2 ... Hd ... Pk ... Amici (2155) ... Bessel (*Briefwechsel mit Olbers* I, 47) parallax ... J (*Madras Obsns.* **VII**) parallax ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2198, 3680) ... Waldo (2190) ... Δ (*Mem. Accad. Sci.*) ... Δ (1032) ... Δ (**I, II**) ... OΣ (**IX**) ... Hl (*Wash. Obsns.* 1886) ... Hl (**I, II**) ... Pt ... Kustner (2584) ... Franz (2590) ... Per ... Per (2685, 2748) ... Nobile (*R. Accad dei Lincei*, Nov. 1875) .... Sp (**II**) .... Giacomelli (**III**) .... Je (2369, 2449, 2772) ... T (2866) ... Hayn (3051) ... Knorre, See (*Beob. Berlin*, No. 6, 1892) .... Edney (*Mon. Not.* **LIV**, 317) .... β^1 .... β (2930, 3048) (*Pub. L. O.* **II**) ... Ho (3234) ... Glasenapp (**I, II, III, IV**) ... Maw (**I**) ... Cohn (3240) ...

Barnard (*A. J.* 447).... Collins (*A. J.* 378).... Hu (*A. J.* 397).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 508, 518; **LXII**, 383; **LXIII**, 403; **LXIV**, 801)...Coleman (*Mem. R. A. S.* **LIII**)...A (3585)(*A. S. P.* **VII**, 305)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Boeger (*A. J.* 522)... Biesbroeck ...β^6...]

$9^m\ 12^s$ **7915.** **β** 44. Discovered with the 6-inch. Probably unchanged.

1874.98	20°9	5″51	2*n*	OΣ	7.8...9.5
1892.48	19.2	5.54	3*n*	Lv	8.4...9.5
1903.05	17.6	5.58	4*n*	Doo	

[β (**I**)... β (*Mon. Not.* **XXXIII**, 351) ... OΣ (**X**)... Δ (**I**)... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9 25 **7917.** **β** 958. Discovered with the 18½-inch. The later measures are:

1888.45	216°2	1″37	1*n*	Lv
1892.39	216.9	1.38	3*n*	β
1897.66	212.6	1.61	1*n*	See
1898.44	213.6	1.66	3*n*	A
1905.32	213.4	1.78	3*n*	Doo

[β (**XIII**)...β^3...β (3142) (*Pub. L. O.* **II**)...Lv^1...See (3496)...A (3585)...]

9 31 **7918.** **Ho** 558. The only later position is:

1903.59	209°5	8″20	3*n*	Doo

[Ho (3557)...]

9 34 **7919.** **Hu** 171. A 10m star, 203°0 : 6″40.

[Hu (*A. J.* 485)...]

9 40 **7920.** **β** 1119. Discovered with the 12-inch.

1897.60	357°5	0″54	3*n*	A
1897.66	353.7	0.56	1*n*	See

[β (**XVI**)...β (2956) (*Pub. L O* **II**)...A (3465)...See (3496)...]

10 1 **7921.** **O. Stone** 33. The place in Cin^6 is erroneous in R. A. and Decl.

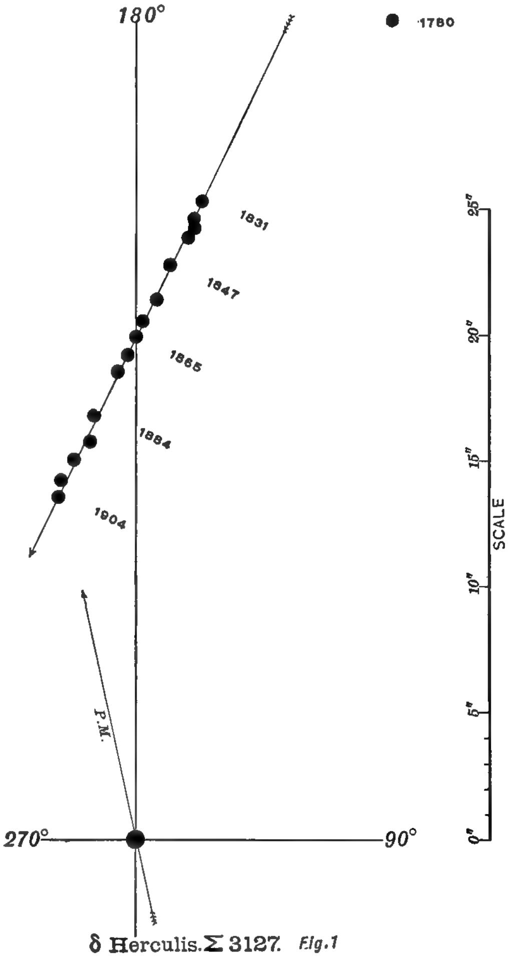
1900.52	46°7	1″15	3*n*	Hu	8.5...10.0

[Cin^6...Hu (*Bul. L. O.* No. 44)...]

10 6 **7922.** δ *Herculis.* **Σ** 3127. (= **H** V. 1 = **Sh** 246.) A system of the 61 *Cygni* type, the change being due to the difference of the proper motions of the components. The movement of the large star is given from meridian observations:

Auwers	0″154	in 191°7
Bossert	0.155	in 195.2
A. G. Berlin	0.157	in 194.0

The companion is moving nearly at right angles to the other, at a little smaller rate. The measures give the annual motion of the small star, 0″117 in 275°2.

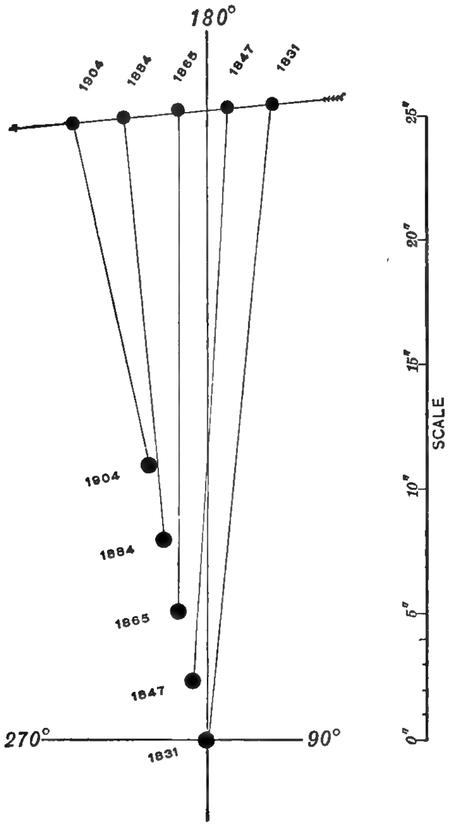


δ Herculis. Σ 3127. Fig. 1

The following measures are shown on Fig. 1:

1780.15	162°5	34″22	2*n*	H
1831.72	174.0	25.62	6*n*	Σ
1835.98	174.5	24.94	8*n*	Σ
1837.74	174.4	24.58	3*n*	Σ
1841.66	175.9	24.14	4*n*	OΣ
1847.37	176.5	23.04	3*n*	OΣ
1856.01	177.7	21.61	3*n*	OΣ
1861.48	179.2	20.71	3*n*	OΣ
1865.83	179.8	20.11	12*n*	Δ
1870.00	180.8	19.42	8*n*	Δ
1872.91	182.1	18.80	3*n*	OΣ
1877.01	182.2	18.30	16*n*	Δ
1884.53	185.5	17.00	2*n*	Hl
1890.49	186.6	16.00	2*n*	Gla
1895.62	189.2	15.38	2*n*	Collins
1902.55	191.7	14.60	5*n*	Gr. Obsy.
1904.28	192.7	14.05	3*n*	β

On Fig. 2 five positions are shown (1831–1904) as the two stars are actually placed in space at the dates of the respective measures.



δ Herculis. Σ 3127. *Fig.2*

[Ma (*F. S.* **II**)...Ma (**IX**, **XV**)...Σ¹...J²...J³...WJ²...Se¹...Du...Ra (**XXII**, **XXXIV**)...Kn...Hd...K (1519)...Fl...OΣ (**IX**, **X**)...Δ (*Mem. Accad. Sci.*)...Δ (1036, 1118, 1196, 1475, 1574, 1736, 1799, 1888, 1979, 2081, 2193)...Δ (**I**, **II**)...Flm...Pk...Pl...En (1518, 1674, 2677)...Do (2198)(*Trans. R. I. Acad.* **XXIX**, Part 13)...T (2899)...Je (2407)...Per...Per (2560)...Sp (**II**)...Jones (*A. J.* 312)...Hl (*Wash. Obsns.* 1884)...Hl (**I**, **II**)...Glasenapp (**I**, **III**)...Maw (**I**) Sk....Sk⁴....Collins (*A. J.* 378)....Searle (*A. J.* 299)....Chofardet (3450). .. Lehman (*Pub. A. S. P.* **IX**, 141)....Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXIII**, 403)...*Annals Toulouse Obsy.* **III**...Biesbroeck...β⁶...]

$10^m 12^s$ **7923.** 38 *Ophiuchi.* **S 685.** (= **Ħ I. 35.**) This is 31 *Scorpii* of some star catalogues. The measures are very discordant. There is probably no change. The brightness of both stars greatly underestimated by South.

1783.18	330°.8	....	1*n*	Ħ	
1876.55	333.4	6″.12	2*n*	Cin	7.0...9.0
1878.39	333.9	5.26	2*n*	Cin	7.2...9.0
1888.49	335.0	5.78	2*n*	Lv	6.0...8.0
1890.48	334.8	5.54	2*n*	Gla	6.5...8.2
1897.43	335.6	5.55	3*n*	Doo	7.6...9.6
1903.59	337.1	5.97	2*n*	Scott	

[H (**VIII**)... *Wash. Obsns.* 1862...Cin³...Cin⁴...Cin⁵...Lv¹... Glasenapp (**I**)....Scott (*Brit. Ast. Ass'n* **V**, 75)(*Mon. Not.* **LXIV**, 52).... See (3496).... Doolittle (*Pub. Flower Obsy.* **I**)...]

7925. **Σ 2146.** No change. The principal star is given a proper motion of 0″.135 in 333°.8 (*A. G. Harvard.*) $10^m 27^s$

1866.65	226°.5	2″.76	3*n*	Δ
1879.29	225.2	2.84	1*n*	β
1903.31	226.8	2.63	2*n*	β

[H¹...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β³...β⁶...]

7926. **H 854.** This is the variable *U Ophiuchi*, discovered by Sawyer. It is of the *Algol* type, and varies from 6.0 to 6.7 m in $20^h 7^m 41^s.6$. It is 6 m in Heis and Arg. U. N. 10 27

1878.51	358°.8	20″.24	1*n*	β
1897.67	357.8	21.07	3*n*	Doo
1904.88	358.0	20.63	2*n*	β

[Sawyer and Chandler (2448, 2484)....β¹....Doolittle (*Pub. Flower Obsy.* **I**)....β⁶...]

7927. **Σ 2141** *rej.* From H (VII). The only measures are: 10 38

1903.31	126°.1	32″.77	2*n*	β⁶	8.1...9.5

7928. 39 *Ophiuchi.* **Ħ III. 25.** (= **Ħ VI. 54** = **Sh 245.**) Probably without change. The larger star has a proper motion of 0″.085 in 258°.5 (Auwers). 10 42

1822.40	355°.8	12″.51	1*n*	Sh	7 ...8
1828.36	356.6	12.34	1*n*	H	
1857.00	355.2	10.77	2*n*	Se	5.5...6.7
1879.33	354.9	10.71	2*n*	Cin	5.2...7.5
1890.40	354.6	10.28	2*n*	Gla	5.4...6.6
1891.71	354.4	10.55	2*n*	Tebbutt	
1904.39	356.2	10.63	2*n*	β	

[H (**II**, **VIII**)... H¹... Se¹... J²... Ra (**XXII**)... Pk... Cin⁴... Cin⁵... β (*Mon. Not.* **XXXIV**, 377)... Glasenapp (**I**)... Tebbutt (*Mon. Not.* **LII**, 386)... Scott (*Brit. Ast. Ass'n* **V**, 75)...Do (3798)...β⁶...]

7929. **β 416.** *Scorpii* 185. **B. A. C. 5825.** The duplicity of the principal star of the wide pair, H 4935, was discovered with the 6-inch. This is now known to be one of the most interesting systems in the heavens. It is of additional interest by reason of its large proper motion of 1″.15 in the direction of 98°.1 (Porter). This movement and the rapid angular motion, in connection with the comparatively large apparent distance between the components, suggests the possibility of this system having a measurable parallax. The distant companion has the same proper motion. 10 47

Several orbits have been computed. The dates in the first column give the last measures used.

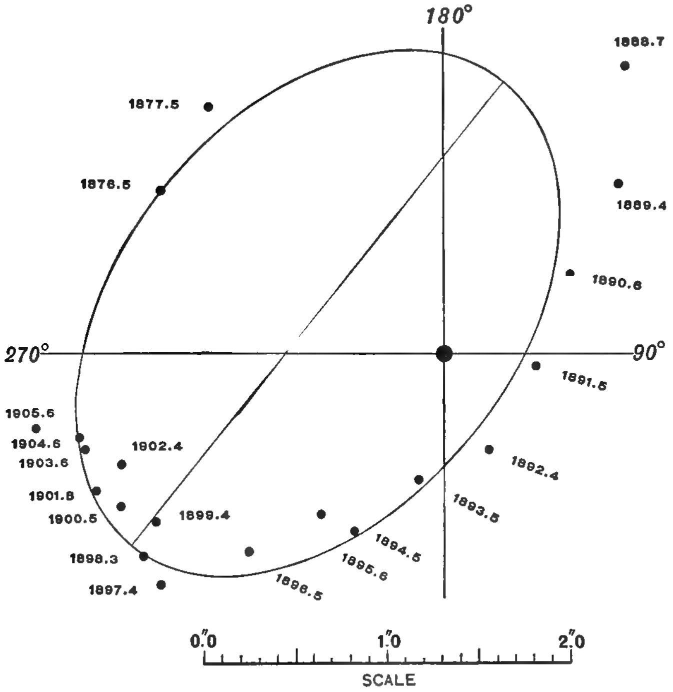
1892	Gore	34.48 yrs.	*Mon. Not.* LIII, 335
1892	Glasenapp	34.85	*Ast. and A.-P.* XII, 402
1892	Burnham	24.7	*Pub. L. O.* II, 247
1893	Glasenapp	32.23	*Proc. Soc. N. S. Wales*, June, 1894
1895	See	33.0	*Evolution of the Stellar Systems*
1901	Doberck	45.90	*A. N.* 3908
1904	Lohse	46.04	(Unpublished)

The ellipse shown on the diagram gives a period of about 39 years.

The following are all the measures of the close pair:

A and B

1876.52*	240° ±	1″8 ±	1*n*	β
1877.53*	222.6	1.80	1*n*	Cin
1877.64*	224.4	1.97	1*n*	Russell
1888.72*	147.5	1.89	1*n*	β
1889.43*	134.1	1.35	3*n*	β
1889.63	131.9	0.97	1*n*	Pollock
1890.60*	122.0	0.82	2*n*	Sellors
1891.53*	82.3	0.51	3*n*	β
1892.38*	24.4	0.58	4*n*	β
1893.55*	348.3	0.71	5*n*	Sellors
1894.56*	334.5	1.30	5*n*	Barnard
1894.57*	331.8	0.88	7*n*	Sellors
1895.60*	321°7	0″91	2*n*	Com
1895.62*	322.2	1.43	3*n*	Sellors
1895.74*	321.4	0.99	1*n*	See
1896.44*	314.8	1.45	3*n*	A
1896.46*	315.4	1.61	3*n*	Scott
1896.59*	315.8	1.87	4*n*	Sellors
1896.60*	314.9	1.26	1*n*	Com
1897.38	307.0	1.69	1*n*	See
1897.46*	309.1	2.00	3*n*	A
1897.47	308.8	1.80	5*n*	Scott
1897.47	310.2	1.86	4*n*	Lehman
1898.35*	303.8	1.99	4*n*	A
1899.38*	300.2	1.83	4*n*	A
1899.42*	299.1	1.78	5*n*	Doo
1900.42	299.0	1.95	3*n*	Tebbutt
1900.49*	295.6	1.91	3*n*	A
1900.53	299.0	2.17	4*n*	Lunt
1900.60*	294.2	2.02	3*n*	Doo
1901.77*	291°4	2″06	2*n*	Do
1902.36	292.1	2.29	3*n*	Innes
1902.44*	288.9	1.87	3*n*	A
1902.49	290.0	2.57	4*n*	Tebbutt
1903.56*	286.1	2.07	3*n*	A
1903.62*	283.3	2.03	9*n*	Doo
1903.66	287.1	2.25	5*n*	Scott
1904.63*	282.8	2.03	1*n*	A
1905.63*	280.1	2.30	1*n*	A



β 416

The distant star, noted by Herschel at the Cape of Good Hope, was not measured by him, and the angle only estimated from a diagram. The measures since 1889 show beyond question that this star is moving in space with the close pair, and that the three form a triple system. See measures a 13.2 m star 86°1 : 55″42 (1897.38) 1*n*.

A and C (= H 4935)

1889.43	128°6	31″03	3*n*	β
1891.53	128.8	30.52	3*n*	β
1892.36	129.4	30.55	2*n*	β
1894.61	129.4	30.01	1*n*	Barnard
1895.58	130.1	30.50	1*n*	Com
1897.38	129.3	29.98	1*n*	See
1898.41	130.4	30.22	2*n*	A

[β (**VII**)...β (2103, 2957, 3114, 3142) (*Pub. L. O.* **II**) (*Sid. Mess.* **X**, 489) (*Ast. and A.-P.* **XII**, 792)....Russell (*Pub. Sydney Obsy.* 1871–81)....Cin⁴....Pollock (*Pub. Sydney Obsy.* 1891)(*Mem. R. A. S.* **L**)...Sellors (3154, 3240, 3274, 3303, 3369)...Barnard (*A. J.* 447)...Com (**X**)...Lehman (*Ast. Soc. Pac.* **IX**, 141)... Everett (*Mon. Not.* **LVI**, 464)....Scott (*Brit. Ast. Ass'n* **VIII**, 66) (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Innes (*A. J.* 385) (*Mon. Not.* **LVIII**, 90) (*Annals Cape Obsy.* **II**)....A (3396, 3465, 3585, 3639) (*Bul. L. O.* No. 11)....See (3496) (*A. J.* (359, 372, 378)(*Evolution of the Stellar Systems*)...Tebbutt (*Mon. Not.* **LXI**, 501; **LXIV**, 68)....Lunt (*Mon. Not* **LXI**, 603)....Do (3798, 3908).... Doolittle (*Pub. Flower Obsy.* **I, II**)...Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1078)

7930. **Σ 2144** *rej.* Measures by Mitchel (Cin²). Nothing since but the following: 10^m 53^s

1901.39 182°6 25″45 2*n* β⁵ 7.6...10.2

The angle by Mh is 180° in error.

7931. **O. Stone 34.** Not identified in any star catalogue. 11 :

1880.46	288°7	16″87	2*n*	Cin	8.0...8.5
1903.64	290.1	16.9	1*n*	Scott	

[Cin⁵...Cin⁶...Scott (*Mon. Not.* **LXIV**, 52)...]

7932. **β 1200.** Discovered with the 36-inch. The *p* of two 8 m stars, same declination, and 33ˢ apart. Near *a Herculis.* The later measures show no change. 11 5

1896.46	14°1	1″21	2*n*	Lewis	
1901.73	1.6	1.21	3*n*	A	8.0...13.5
1902.52	8.7	1.40	1*n*	Lewis	7.8...12.2
1903.48	12.6	1.40	2*n*	Doo	

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400; **LXIII**, 403) ...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7933. **Hn 132.** Nothing since but the following: 11 36

1900.52 31°6 1″73 3*n* Doo 9.6...10.5

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11^{m} 44^{s} **7934.** **Hu 172.** A later position:

1903.52	344°4	0″70	1*n*	Lewis

[Hu (*A. J.* 485)...Lewis (*Mon. Not.* **LXIV**, 802)...]

11 47 **7935.** **H. C. Wilson 15.** (AC = **Σ 2145.**) The duplicity of the principal star was discovered by Wilson in 1892 with the 16-inch at the Carleton Observatory, but it had been previously seen and measured by HΣ at Poulkowa. So far without change.

1891.78	41°6	0″3±	1*n*	HΣ
1892.58	45.4	0.46	4*n*	Wilson
1892.81	49.7	0.41	2*n*	Barnard
1893.49	40.8	0.60	1*n*	Lv
1893.54	50.5	0.50	1*n*	Ho
1901.41	41.8	0.34	2*n*	A
1902.57	43.6	0.53	2*n*	Lewis
1903.56	30.0	0.45	2*n*	Lewis

The change in the Struve star is due to proper motion. The close pair seems to have an annual movement of 0″054 in 16°.

AB and C

1830.99	174°2	9″79	2*n*	Σ
1843.65	177.1	10.61	3*n*	Ma
1851.90	177.2	11.28	3*n*	Ma
1864.90	177.8	11.34	5*n*	Δ
1879.24	178.6	12.25	3*n*	Sp
1892.55	179.5	12.74	3*n*	Wilson
1895.50	179.6	12.82	2*n*	Gla
1901.41	180.3	13.53	2*n*	A
1903.44	180.5	13.57	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)... Δ (1474)... Δ (**II**)... Flm...WS^{2}...Sk... Cin^{5}...Sp (**II**)...Ho (3234)...Wilson (*Ast. and A.-P.* **XII**, 112)... Big (*Bul. Ast.* **XII**, 299)...Barnard (*A. J.* 447)...Glasenapp (**IV**)...A (*Bul. L. O.* No. 11) ....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)....Lewis (*Mon. Not.* **LXIII**, 403; **LXIV**, 802)...Sk^{6}...Do (3931)...]

11 53 **7936.** **OΣ 327.** **P. XVII. 58.** If the angle has not been reversed since the measures of OΣ, there has been but little motion.

1842.72	338°9	0″36	2*n*	OΣ
1843.37	159.8	0.37	2*n*	Ma
1850.17	342.2	0.51	2*n*	OΣ
1866.44	Doubtful			Δ
1878	Single			β
1885.40	Single			Per
1886.55	Doubtful			Per
1891.33	302.2	0.20	3*n*	β
1895.35	312.8	0.29	2*n*	Barnard
1896.58	316.0	υ.30	2*n*	Lv
1897.54	312.5	0.32	3*n*	A
1898.54	136.1	0.33	3*n*	Hu

[OΣ (**IX**)... Ma (**XI**)... Δ (**I**, p. 229)... Per...β^{1}...β (3114) (*Pub. L. O.* **II**)... Barnard (*A. J.* 447)....Lv (*A. J.* 407)....A (3466, 3639)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIV**, 802)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

12 8 **7937.** **Hu 668.** With a later measure the mean is:

1903.44	30°4	1″20	2*n*	Hu	8.5...13.5

[Hu (*Bul. L. O.* No. 57)...]

7938. **Σ 2151.** Fixed. 12^{m} 10^{s}

1867.06	353°0	2″56	3*n*	Δ
1904.54	352.7	2.39	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)... Δ (**II**)... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...]

7939. **Schj 14.** This place is given from Schjellerup's *Catalogue of 10,000 Stars*, and the estimated angle and distance agree with the measures by Dembowski. In Schj (1485), where this is included in a list of new pairs, the R. A. is given 8^{m} more, and this correction is made in the Errata at the end of Δ (II). Both stars are in *A. G. Albany*, with the R. A. given here. These stars are No. 5726 (8.6) and No. 5725 (9.0), the small star being 0^{s}4 *p* and 23″1 *n* of the other. A recent examination shows the place is correct, and that the stars are fixed. 12 29

1903.31	342°5	24″60	2*n*	β	8.6...8.7

[Schj (1485)... Δ (**I**)...β^{6}...]

7940. **OΣ 326.** Perhaps a little change. These are all the later measures: 12 34

1865.51	204°3	15″38	1*n*	Δ
1898.48	211.8	16.02	4*n*	Hu

[OΣ (**IX**)...Ma (**XI**)... Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

7941. **Hu 750.** The mean of this and a later measure is: 12 38

1903.48	134°0	1″98	2*n*	Hu	8.7...9.2

[Hu (*Bul. L. O.* No. 65)...]

7942. **Σ 2147.** No material change. 12 53

1868.24	95°1	6″53	4*n*	Δ
1903.61	93.7	6.35	1*n*	Lewis
1904.57	92.2	6.21	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)... Δ (**II**)... Cin^{5}... Lewis (*Mon. Not.* **LXIV**, 802)...]

7943. **β 126.** The close pair was discovered with the 6-inch, and the third star subsequently added with the 18½-inch. The measures show no change in either companion. This is a naked-eye star in *Ophiucus;* Gould 6.1 m. B. A. C. 5839. 12 54

A and B

1877.41	260°6	1″58	2*n*	Cin
1879.54	261.3	1.24	2*n*	β
1879.58	261.9	1.81	4*n*	Sp
1884.41	261.5	1.94	2*n*	W
1888.54	263.4	1.89	2*n*	Lv
1890.50	262.8	2.20	2*n*	Gla
1892.37	262.0	1.67	3*n*	β
1897.45	262.4	1.66	2*n*	Scott
1898.28	261.3	2.11	3*n*	Doo

A and C

1879.27	140°4	11″59	1*n*	Cin
1887.69	138.2	11.12	1*n*	Ho
1892.37	138.9	11.59	3*n*	β

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59)... β^{3}... β (3142) (*Pub. L. O.* **II**)... Δ (**I**)... Δ (2086)... Cin^{4}... Cin^{5}... Lv^{1}...Wilson (Cin^{10})... Sp (**II**)... Ho (2978)... Glasenapp (**I**)... Scott (*Brit. Ast. Ass'n.* **VIII**, 66) (*Mon. Not.* **LXIV**, 52)... Doolittle (*Pub. Flower Obsy.* **I**)...]

$12^{m}\ 54^{s}$ **7944.** **68** (*u*) *Herculis.* **OΣ 328.** The large star is variable, 4.6 to 5.4 m, in about 40 days; discovered by Schmidt. There is no change in the position of the companion. The large star has a proper motion of 0″049 in 279°3 (Auwers). This was found to be a spectroscopic binary by Frost and Adams (*Astrophysical Jour.* XVII, 381).

1869.19	60°9	4″22	5*n*	Δ
1884.51	59.4	4.49	4*n*	Per
1898.43	59.9	4.49	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Kn...Δ (**I**)...Schmidt (1767, 2075)...Per...Per (2560, 2749)...β^1...β^2...Ho (2978)...Brown (3646)...Hu (*Pub. L. O.* **V**)...]

13 0 **7945.** **β 629.** Discovered with the 18½-inch. No sensible motion.

1890.62	340°9	1″05	1*n*	Sp
1891.85	343.8	1.01	6*n*	β
1895.56	343.8	0.95	1*n*	Sp
1898.67	344.1	1.08	4*n*	Gr. Obsy.
1900.30	342.7	1.06	5*n*	Lewis
1900.95	342.9	1.17	6*n*	Doo

[β (**X**)...β^1...β (3114, 3142) (*Pub. L. O.* **II**)...Sp (**III**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383)....Doolittle (*Pub. Flower Obsy.* **I, II**)...]

13 4 **7946.** **Hd 144.** This appears to be 36 *Ophiuchi* (No. 7905) with error in Hd of about 5^{m} R. A.

13 11 **7947.** **Σ 2148.** Probably unchanged.

1866.75	221°8	5″28	3*n*	Δ
1905.28	220.9	5.41	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Se...Δ (**II**)...Glasenapp (**I**)...β^6...]

13 17 **7948.** **S 686.** These are all the observations since 1825:

1879.36	4°4	53″99	1*n*	Cin^5	7.5...8.5
1903.48	3.9	52.89	2*n*	β^6	7.9...8.1

13 22 **7949.** **A 231.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

13 23 **7950.** **Ho 67.** No motion:

1893.51	263°0	6″88	2*n*	Ho
1903.34	260.9	6.76	3*n*	Doo
1905.52	260.8	6.88	2*n*	β

[Ho (2778, 3234)...β^6...]

13 25 **7951.** **β 127.** Discovered with the 6-inch. Apparently unchanged.

1890.42	97°1	4″91	2*n*	Gla
1896.52	86.4	5.27	[illegible]	Scott
1897.49	93.2	4.92	1*n*	See
1898.47	93.0	5.04	3*n*	A

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Cin^3...Cin^4...Cin^5...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n* **VIII**, 66)...See (3496)...A (3585)...]

7952. **β 45.** Discovered with the 6-inch. No relative motion. $13^{m}\ 29^{s}$

1873.47	289°3	5″04	1*n*	OΣ	8.0...8.5
1892.40	289.8	4.98	2*n*	β	8.6...8.8
1902.73	290.1	5.07	7*n*	Doo	

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3142) (*Pub. L. O.* **II**)...Δ (**I**)...WS^2...OΣ (**X**)...Greenwich Obsy. (*Mon. Not.* **LX**, 508; **LXI**, 486)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7953. **Σ 2149.** Probably unchanged, but the measures are very discordant in distance. 13 32

1848.60	23°7	6″96	1*n*	Mh
1856.49	26.4	7.71	1*n*	Se
1863.61	23.9	7.82	1*n*	Hl
1865.55	23.6	8.24	1*n*	Se
1867.11	24.9	7.32	3*n*	Δ
1890.46	25.7	8.56	2*n*	Gla
1901.81	24.4	7.38	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VIII**)...Mh...Se...Se^2...Hl (*Wash. Obsns.* 1862)...Hl (**I**, p. 133)...Δ (**II**)...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...β^5...]

7954. **OΣ (App) 152.** No change. 13 33

1905.34	49°1	51″83	1*n*	β

[Δ (**I**)...Franz (3464)...β^6...]

7955. **β 628.** Discovered with the 18½-inch. This pair, β 45, β 629, and β 630 are all in the same vicinity, and near 68 *Herculis* (OΣ 328). Change in angle. 13 55

1892.30	358°6	0″52	3*n*	β
1898.71	354.2	0.46	1*n*	Brown
1900.60	355.8	0.50	3*n*	Lewis
1903.30	352.7	0.49	4*n*	Doo
1905.37	351.2	0.47	3*n*	Doo

[β (**X**)...β^1...β (3142) (*Pub. L. O.* **II**)...Sp (**III**)...Brown (3646)...Greenwich Obsy. (*Mon. Not.* **LX**, 508; **LXI**, 486; **LXII**, 383)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

7956. **Lewis 15.** Another pair 2′*s*, 28°3 : 5″55 (1900.52) 1*n*. 14

[Lewis (*Mon. Not.* **LIX**, 400; **LXI**, 486)...]

7957. *ν Serpentis.* **Sh 247.** (= **H V. 29** = **σ 542.**) No measures in H. Probably unchanged. The large star has a proper motion of 0″034 in 12°5 (Auwers). 14 4

1863.61	31°6	48″09	1*n*	Hl	6 ...10
1890.48	29.5	47.31	2*n*	Gla	4.9... 8.5
1900.49	29.9	47.49	2*n*	Hu	... 9.0
1903.34	29.7	46.87	3*n*	β	... 9.5

[Hl (*Wash. Obsns.* 1863)...Hl (**I**, p. 133)...Glasenapp (**I**)...Pk...Hu (*Bul. L. O.* No. 44)...β^6...]

(See p. 1079)

7959. **Σ 2152.** Without change. 14 17

1868.32	247°6	1″96	4*n*	Δ
1871.19	250.5	1.89	3*n*	Du
1895.47	242.1	1.77	2*n*	Gla
1905.48	246.1	2.10	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...Δ (**II**)...Glasenapp (**IV**)...]

$14^{m}\ 24^{s}$ **7960.** **H 2805.** "Unless Decl. 30′ less." The place given is substantially that of the 9.5 m star, DM (23°) 3083, and there is no DM star 30′ *s*.

1904.60	157°.4	17″.55	2*n*	Duncan

14 28 **7961.** **See 325.** Later measures:

1899.45	233°.7	3″.50	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

14 37 **7962.** **Σ 2155.** *Draconis* 132. Unchanged. The large star has a proper motion of 0″.031 in 315°.1 (Kustner).

1865.76	114°.2	9″.51	3*n*	Δ
1879.29	113.5	9.67	1*n*	β
1897.50	113.6	9.86	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... β3... Glasenapp (**V**)... Espin (*Mon. Not.* **LXIV**, 677)...]

(See p. 1079)

14 44 **7963.** **Ho 413.** The later measures are:

1903.42	286°.8	7″.41	3*n*	Doo
1904.62	287.9	6.84	2*n*	Miller

[Ho (3234)...]

14 46 **7964.** **β 630.** Discovered with the 18½-inch. Apparently no change.

1892.33	224°.8	1″.45	3*n*	β
1898.68	223.5	1.48	4*n*	Gr. Obsy.
1900.53	224.1	1.44	4*n*	Lewis
1905.35	224.5	1.34	3*n*	Doo

[β (**X**)...β1...β (3142) (*Pub. L. O.* **II**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383)...]

14 50 **7965.** **Σ 2153.** There seems to be some change in the angle, but the measures are discordant.

1858.89	276°.0	1″.59	3*n*	Se
1868.97	271.3	1.90	5*n*	Δ
1871.20	274.0	1.85	3*n*	Du
1882.00	272.2	1.93	6*n*	Hl
1889.71	270.7	2.10	2*n*	HΣ
1898.42	267.0	1.76	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Se2...Flm...Du...Δ (**II**)...Δ (1735)...Sk2...En (2677)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Big...Big (*Bul. Ast.* **XII**, 299).... Collins (*A. J.* 378).... Glasenapp (**IV**).... Doolittle (*Pub Flower Obsy.* **I**)...HΣ (**XII**)...]

14 55 **7966.** **See 326.** Later measures:

1899.55	11°.8	0″.57	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

7968. **Σ 2150.** There seems to be some change in angle and distance. This is not in DM, but is in the field *sp* DM (1°) 3422, the place of which is given in Part I. The following are all the measures: $15^{m}\ 10^{s}$

1832.16	184°.8	8″.08	3*n*	Σ
1866.72	192.1	8.23	4*n*	Δ
1879.30	192.1	8.71	1*n*	Cin
1896.48	196.4	9.22	3*n*	Lv
1897.43	197.3	8.92	5*n*	Doo
1905.31	199.1	9.01	2*n*	β

A and DM (1°) 3422

1905.36	57°.6	163″.46	1*n*	β

[Ma (*F. S.* **II**)....Δ (**II**)....Cin5.... Lv (*A. J.* 407).... Doolittle (*Pub. Flower Obsy.* **I**...*Annals Toulouse Obsy.* **III**...β6...]

7969. **Hu 669.** With another measure the mean is: 15 13

1904.38	79°.4	0″.22	2*n*	Hu

[Hu (*Bul. L. O.* No. 57)...]

7970. **Σ 2154.** Fixed. 15 23

1868.66	249°.1	2″.09	3*n*	Δ
1895.47	248.7	1.84	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**IV**)...]

7971. **Swift.** Discovered by Dr. Lewis Swift. 15 41

1899.53	140°.8	0″.43	1*n*	Bryant
1904.75	134.7	0.81	4*n*	Miller

[β (2957) (*Pub. L. O.* **II**)...Bryant (*Mon. Not.* **LX**, 508)...]

7972. 70 *Herculis.* **S 687.** (= σ 543.) The principal star has a proper motion of 0″.037 in 282°.3 (Auwers). The only measures since 1825 are: 15 58

1879.39	56°.1	220″.73	1*n*	Cin5	5.5...9.0
1903.57	56.3	220.63	3*n*	β6	

7974. **H 1298.** Nothing since Herschel but the following: 16 6

1904.73	231°.3	8″.72	3*n*	Miller

7975. **β 959.** *Ophiuchi* 185. Discovered with the 18½-inch. There is no relative motion. Lalande 31588. 16 9

1891.48	257°.3	3″.15	5*n*	β
1898.67	256.0	3.53	2*n*	Brown
1902.98	256.8	3.17	6*n*	Doo
1903.34	253.7	3.56	2*n*	β

[β (**XIII**)...β3...β (3114) (*Pub. L. O.* **II**)...Cin5... Brown (3646)...β6... Doolittle (*Pub. Flower Obsy.* **II**)...]

16^m 10^s **7976.** 72 *Herculis.* **σ 544.** The change in the distant star corresponds exactly to the large proper motion of A, which is given 1″039 in the direction of 174°4 (Auwers).

1853.35	327°5	162″64	3*n*	OΣ	...9.3
1856.56	328.0	165.80	1*n*	OΣ	
1861.52	328.7	170.10	1*n*	OΣ	
1883.48	331.5	191.31	2*n*	HΣ	
1900.47	332.3	207.54	2*n*	β	...9.6

There is a faint companion to B:

1900.47	216°8	8″68	2*n*	β	...12.5

[β^1...OΣ (**X**)...β^5...]

(See p. 1079)

16 11 **7977.** **Hu 670.** With a later measure the mean is:

1904.38	6°8	0″21	2*n*	Hu	8.7...10.5

[Hu (*Bul. L. O.* No. 57)...]

16 21 **7978.** **A 232.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

16 31 **7979.** **β 1248.** Discovered with the 36-inch. No motion.

1897.57	164°4	8″08	2*n*	A
1902.94	165.0	8.12	6*n*	Doo
1903.23	165.5	8.22	3*n*	β

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3465)...Doolittle (*Pub. Flower Obsy.* **II**)...β^6...]

16 35 **7980.** **Hn 133.** The only other position is:

1904.66	163°8	0″96	3*n*	Cogshall

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

16 46 **7981.** **Hn 28.** Fixed.

1888.43	232°8	3″51	3*n*	Com
1905.35	232.3	3.35	3*n*	Doo

[β^4...Com (**VI**)...]

17 9 **7982.** **H 4948.** (= **H 4851.**) There is an error of 1^h in the R. A. of H 4851. It is identical with H 4948. The only measure is:

1901.47	105°4	13″14	3*n*	β^5	8.3...9.8

17 19 **7983.** **Ho 414.** No material change.

AB	1901.47	88°8	0″56	2*n*	A
	1903.33	87.1	0.47	3*n*	Doo
AC	1903.33	304.6	31.20	3*n*	Doo

[Ho (3234)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

17 21 **7984.** **β 242.** Discovered with the 6-inch. The measures show no change in any of the companions.

A and B

1879.60	73°6	0″92	3*n*	Sp
1892.48	70.9	0.99	3*n*	Lv
1898.63	73.4	0.83	1*n*	Brown

AB and C

1890.49	63°3	9″35	2*n*	Lv
1898.63	62.5	9.62	1*n*	Brown

AB and D

1892.48	64°8	47″83	1*n*	Lv
1898.63	63.6	47.92	1*n*	Brown

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (**I**)...Sp (**II**)...Lv^1...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Brown (3646)...]

7985. **H 3346.** The only measures are: 17^m 28^s

1904.58	30°7	13″72	3*n*	Duncan
1905.34	27.9	12.87	1*n*	β^6

7986. **Σ 2157.** Probably fixed. 17 31

1866.52	204°8	3″49	3*n*	Δ
1903.61	207.7	3.29	1*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Se...Δ (**II**)...Glasenapp (**I**)...Lewis (*Mon. Not.* **LXIV**, 802)...]

(See p. 1079)

7987. **β 1284.** This pair was discovered with the 18½-inch August 11, 1884, but not included in my catalogues of that time. It was looked for with the 36-inch in 1891 and not found, but it now appears that the declination used was 10° too small. In the measures by Lewis (*Mon. Not.* LIX, 416) this is called β 46. There is no indication of change. 17 38

1884.61	180° ±	1″5 ±		β	8 ...11
1896.53	182.2	1.20	1*n*	Lewis	8.0...14
1899.42	180.1	1.23	3*n*	β	8.3...11.3

[β (*Pub. Y. O.* **I**)...]

7988. **Kr 46.** Double in *A. G. Hels.* 17 41

1898.41	63°5	1″69	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

7989. **Hn 134.** (= **Ho 266.**) The only later measures are: 17 42

1890.52	147°3	3″43	1*n*	Ho
1902.51	145.8	3.96	3*n*	Doo

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Ho (2977, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

7991. **Σ 2156.** The angle in Σ appears to be too small, as the later measures indicate no change. 17 47

1843.51	36°3	3″40	1*n*	Ma
1856.54	37.0	3.42	2*n*	Se
1868.21	36.9	3.30	4*n*	Δ
1885.73	36.3	3.40	5*n*	Hl
1896.59	37.7	3.32	3*n*	Pt
1897.61	34.1	3.35	2*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Mh...Se...Flm...WS...Gl...Pt...Δ (**II**)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (**II**)...Cin^5...Glasenapp (**I**)...Pritchett (*A. J.* 397)...Coleman (*Mem. R. A. S.* **LIV**)...]

$17^m\ 54^s$ **7992.** This star was noted with the 18½-inch as double August 11, 1884, as described in Part I. It was single with the 36-inch in 1891, and not seen double on several occasions since that time. It has a proper motion of 0″.200 in 221°.1 (Porter).

18 5 **7993.** **Σ 2158.** Unchanged.

1866.56	78°.1	23″.24	3*n*	Δ
1904.58	77.6	23.56	3*n*	Duncan

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...]

18 7 **7994.** **β 46.** Discovered with the 6-inch. Relatively fixed. It is the *p* star of a small equilateral triangle; the *f* star is Σ 2159.

1883.68	201°.1	2″.00	2*n*	Ho
1892.49	202.6	1.91	4*n*	Lv
1894.53	203.2	2.15	1*n*	Lewis
1898.64	205.4	1.98	2*n*	Brown

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...WS^2...Δ (**I**)...Ho (2978)...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)....Lewis (*Gr. Obsns.* 1894)....Brown (3646)...]

18 15 **7995.** **Ho 415.** Probably unchanged.

1901.47	337°.7	1″.02	2*n*	A
1903.24	331.6	1.08	3*n*	Doo

[Ho (3234)...A (*Bul. L. O.* No. 11)...]

18 39 **7996.** **Hu 671.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

18 44 **7997.** **Hn 135.** From *Pub. Washburn Obsy.* II. "Searched for on three nights, and not found," Com (VI).

19 9 **7998.** **Σ 2160.** Very little, if any, change. This star is given a proper motion of 0″.017 in 0° (Davis).

1843.44	66°.1	3″.52	5*n*	Ma
1852.61	63.9	3.70	2*n*	Ma
1866.02	66.1	3.68	3*n*	Δ
1882.55	68.3	3.86	5*n*	Hl
1903.47	64.0	3.84	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Mh...Se...Flm...WS...Gl...Δ (**II**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...HΣ (**XII**)...Do (3931)...Davis (*A. J.* 344)...Lewis (*Mon. Not.* **LXIV**, 802)...]

19 19 **7999.** **H 4953.** Probably fixed.

1879.90	175°.3	18″.39	4*n*	Cin	8.5...9.5
1890.46	173.0	19.17	2*n*	Gla	8.7...9.4

[Cin^5...Cin^6...Glasenapp (**I**)...]

8000. **β 128.** (= **Hd 146.**) **B. A. C. 5879.** Discovered with the 6-inch. $19^m\ 34^s$

1891.56	328°.0	4″.04	3*n*	β
1897.68	322.8	3.97	2*n*	See
1902.26	324.2	4.05	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3114) (*Pub. L. O.* **II**)...Cin^3...Cin^4...See (3496)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

8001. **Σ 2159.** Unchanged. 19 2

1865.82	326°.2	26″.30	3*n*	Δ
1890.56	326.6	26.69	5*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIV**)...Δ (1209)...Δ (**I, II**)...Giacomelli (**III**)...Glasenapp (**I, IV**)...*Annals Toulouse Obsy.* **III**...]

8002. **β 1249.** Discovered with the 12-inch. A and C are respectively DM (53°) 1938 and DM (54°) 1875. 19 30

A and B

1897.71	82°.3	0″.46	1*n*	A
1898.71	82.2	0.49	1*n*	Brown
1899.53	83.1	0.30	1*n*	Bryant

AB and C

1898.71	74°.6	63″.66	1*n*	Brown
1903.19	74.5	62.14	3*n*	β

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...A (*A. J.* 429)...Brown (3646)...Bryant (*Gr. Obsns.* 1899)...β^6...]

8003. *ρ Herculis.* **Σ 2161.** (= **H II. 3** = **Sh 248.**) In later measures the angle is larger, but no sensible change is shown. The principal star has a proper motion of 0″.074 in 282°.4 (Auwers), and the companion is moving with it. 19 33

1849.08	310°.4	3″.73	12*n*	OΣ
1868.49	310.7	3.72	7*n*	Δ
1882.01	310.3	3.96	6*n*	Hl
1888.39	312.0	3.86	2*n*	HΣ
1890.53	312.6	3.92	7*n*	Giacomelli
1895.06	311.1	4.04	4*n*	Gla
1904.45	312.2	3.99	3*n*	Doo

[Ma (304, 324)....Ma (**X, XI, XIII, XV**)....Ma (*F. S.* **I**)....H^1....H (**VII**)....Mh...Bp...Da^1...Da^3...Da^4...*Durham Obsns.* 1846–48...J^2...WJ^2...Wr...Se...K...Ra (**XXII, XXVIII, XXIX, XXX, XXXII, XXXIII, XXXIV, XXXV, XXXIX**)...Bru...Ba (**II**)...Hd...Bl (**V**)...Du...WS...Gl...Sk...Pl...Pk...En (1674)...Flm...Giacomelli (**III**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2198, 3680)...Δ (*Mem. Accad. Sci.*)...Δ (1032, 1209)...Δ (**I, II**)...OΣ (**IX**)...Pt...Big...Sp (2133)...Sp (**II**)...Goldney (2257)...Kustner (2584)....Je (2369, 2772)....Per....Per (2529, 2685, 2748)....T (2866, 2898)...Ho (2978, 3558)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Knorre, See, and Wellman (*Beob. Berlin*, No. 6, 1892)...Maw (**I**)...Glasenapp (**I, II, III, IV**)...Big (*Bul. Ast.* **XII**, 299)...Searle (*A. J.* 299)...Collins (*A. J.* 378)...Knorre (3518)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...*Annals Toulouse Obsy.* **III**....Thiele (3837)....Sk^5....Biesbroeck....Doolittle (*Pub. Flower Obsy.* **II**)...]

8004. **Σ 2163.** Change in angle. These are all the measures: 19 36

1830.02	103°.5	1″.51	3*n*	Σ
1846.29	105.5	1.45	1*n*	Ma
1858.90	97.8	1.46	2*n*	Se
1868.97	95.6	1.54	5*n*	Δ

1877.66	91°3	1′2±	1*n*	Sp
1878.30	97.2	1.58	1*n*	β
1882.01	95.6	1.50	5*n*	Hl
1889.71	93.8	1.68	2*n*	HΣ
1899.75	92.2	1.59	5*n*	Gr. Obsy.

[Ma (*F. S.* **I**) . . . *Δ* (1735) . . . *Δ* (**II**) . . . Sp (**II**) . . . Hl (*Wash. Obsns.* 1884) . . . Hl (**I, II**) . . . β^1 . . . Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXII**, 383) . . . HΣ (**XII**) . . .]

$19^m\ 43^s$ **8005.** **Σ 2162.** Fixed.

1867.44	276°8	1′28	3*n*	*Δ*
1895.50	278.1	1.22	2*n*	Gla

[Ma (*F. S.* **I**) . . . Ma (**X**) . . . Se . . . *Δ* (**II**) . . . T (2991) . . . Glasenapp (**IV**) . . .]

20 5 **8006.** **H N. 5.** "Double-double." Identified and measured:

AB	1903.34	353°3	22′92	2*n*	β^6	8.3 . . . 12.2
AC	1905.18	181.8	39.23	1*n*	β^6	. . . 11.8
AD	1903.34	16.0	147.53	2*n*	β^6	. . . 8.5

D is DM (32°) 2910.

20 18 **8007.** **OΣ 329** *rej.* (= **S 688.**) Rejected in the *Poulkowa Catalogue* of 1850, and not measured by OΣ. No evidence of change.

1898.52	12°7	32′97	3*n*	Hu
1900.89	12.4	32.68	2*n*	β

[Ma (**XI**) . . . *Δ* (**I**) . . . Hu (*Pub. L. O.* **V**) . . . Espin (*Mon. Not.* **LXIV**, 678) . . . β^6 . . .]

20 19 **8008.** **β 1250.** Discovered with the 6-inch May 31, 1876, but not included in my catalogues of new pairs published at that time. It is the *s* star of a small equilateral triangle, all in the field. The magnitude in DM is 8.5. Slow motion in angle.

1884.65	60°2	1′41	2*n*	Ho	8.7 . . . 8.7
1891.72	63.7	2.02	2*n*	β	9.4 . . . 9.5
1896.99	68.9	2.23	2*n*	Lewis	
1897.58	67.5	1.84	[illegible]	Bowyer	
1897.71	64.8	1.99	3*n*	A	
1898.70	64.2	2.26	2*n*	Bryant	
1900.54	68.4	1.97	7*n*	Lewis	
1901.47	68.3	2.02	4*n*	Doo	
1903.75	68.2	1.83	3*n*	Biesbroeck	

[β (**XVIII**) . . . β (3113) (*Pub. L. O.* **II**) . . . *Δ* (**I**, p. 347) . . . Ho (2978) . . . A (*A. J.* 429) . . . . Lewis, Bryant, and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803) . . . . Biesbroeck . . . . Do (3931) . . . . Doolittle (*A.J.* 547) (*Pub. Flower Obsy.* **II**) . . .]

20 27 **8009.** **Σ 2164.** No material change.

1867.01	14°7	8′84	4*n*	*Δ*
1904.57	13.9	8.70	3*n*	Miller

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . *Δ* (**II**) . . . Cin^5 . . .]

20 40 **8011.** **S 689.** (= **OΣ (App) 153.** Relatively fixed.

1875.20	197°9	89′63	5*n*	*Δ*	6.7 . . . 7.4
1904.31	197.2	89.49	2*n*	β	7.0 . . . 7.5

[*Δ* (**I**) . . . Franz (3080) . . . β^6 . . .]

$21^m\ 12^s$ **8013.** **H 1299.** The only measures are:

AB	1901.38	20°4	50′65	2*n*	β^5	7.0 . . . 12.0
AC	1901.38	57.5	52.62	2*n*	β^5	. . . 12.5

21 14 **8014.** **β 129 = β 1120.** Discovered with the 6-inch, and inadvertently put as new in β (XVI). Apparently without change. This is B. A. C. 5896.

1880.59	279°4	1′10	3*n*	Sp	7.5 . . . 8.0
1889.14	100.0	0.93	3*n*	β	7.0 . . . 7.0
1890.50	103.3	. . . .	2*n*	Gla	7.2 . . . 8.0
1893.65	100.2	0.86	2*n*	Sel	7½ . . . 7½
1897.57	99.0	0.93	3*n*	A	7 . . . 7+
1897.65	106.4	1.02	1*n*	See	8 . . . 8.4
1901.46	97.5	1.12	[illegible]	Doo	7.0 . . . 7.7

[β (**III, XVI**) . . . β (*Mon. Not.* **XXXIII**, 437) . . . β (2956) (*Pub. L. O.* **II**) . . . Cin^4 . . . Cin^5 . . . Sp (**II**) . . . Glasenapp (**I**) . . . Sellors (3240) . . . A (3465) . . . See (3496) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

21 21 **8015.** **Σ 2167** *rej.* The only measure is the following:

1900.53	222°9	18′24	2*n*	Espin (3717)

21 35 **8017.** **Σ 2165.** *Herculis* **281.** There is some change in the distance. Sp thought the companion elongated in 90° (1877–80). Glasenapp measures a distant 8.8 m star 251°6: 98′15 (1890.52) 2*n*.

1857.48	49°6	7′00	2*n*	Wr
1858.74	46.9	7.11	3*n*	Ma
1866.05	51.2	7.17	8*n*	*Δ*
1877.60	50.7	7.56	5*n*	Sp
1880.38	53.8	7.68	6*n*	Sp
1887.55	52.3	7.75	4*n*	Sp
1890.45	52.6	7.60	2*n*	Gla
1903.53	53.8	8.01	2*n*	Biesbroeck

[Ma (*F. S.* **I**) . . . . Ma (**X, XI, XIII, XV**) . . . . Wr . . . . Se . . . . Hd . . . . Big . . . . WS . . . . WS^2 . . . Sk . . . Flm . . . *Δ* (1572) . . . *Δ* (**II**) . . . Du . . . Sp (**II, II** App.) . . . Gl . . . Do (2198) (*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Glasenapp (**I, IV**) . . . de Ball (2753) . . . . Collins (*A. J.* 378) . . . . HΣ (**XII**) . . . . Boeger (*A. J.* 522) . . . . Sk^5 . . . . Lewis (*Mon. Not.* **LXIV**, 802) . . . Biesbroeck . . .]

21 35 **8018.** **See 329.** Discovered by Cogshall, but in 1899 he could not find it near this place.

[See (*A. J.* 431) . . . Cogshall (*A. J.* 505) . . .]

22 11 **8020.** **Howe 39.** Discovered by Howe at Cincinnati. The faint star C was added by Hough.

1893.54	323°5	4′16	1*n*	Ho

[Cin^1 . . . β^4 . . . Ho (3234) . . .]

22 16 **8021.** **Σ 2166.** Fixed.

1864.58	282°9	27′14	3*n*	*Δ*
1880.90	282.8	27.52	3*n*	Sp
1889.55	282.7	27.29	4*n*	Giacomelli

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Ra (**XXIV**) . . . En . . . *Δ* (1194, 1209) . . . Ma (324) . . . *Δ* (**I, II**) . . . Giacomelli (**III**) . . . Sp (**II**) . . . Je (2369) . . . Glasenapp (**I, III**) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . *Annals Toulouse Obsy.* **III** . . .]

$22^m\ 17^s$ **8022.** **Σ 2179.** Fixed.

1870.15	212°6	5″17	5*n*	Δ
1905.34	212.7	5.22	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)... H (**VI**)...Δ (**II**)... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...β^6...]

22 26 **8023.** **Σ 2168.** Unchanged.

1867.33	198°0	2″38	4*n*	Δ
1877.88	199.2	2.39	2*n*	Sp
1904.45	198.0	2.36	1*n*	Hu

[Ma (*F. S.* I)... Ma (**X, XI**) ... H^1... Se ... Wr ... Ra (**XXV**)?... Du... WS^2... Δ (1194)... Δ (**I, II**) ... Sp (**II**) ... T (2991) ... Glasenapp (**III**)... Knorre (3632) ... *Annals Toulouse Obsy.* **III**...]

22 31 **8024.** **See 330.** Later measures are:

1897.50	169°1	1″62	2*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

22 40 **8025.** **Σ 2171.** The later measures show no material change:

1841.55	71°9	1″68	1*n*	OΣ
1856.47	70.0	1.52	2*n*	Se
1868.34	69.1	1.58	5*n*	Δ
1875.62	69.5	1.42	4*n*	Sp
1884.54	69.7	1.45	3*n*	Hl
1890.41	70.6	2.05	2*n*	Gla
1898.58	67.6	1.77	4*n*	Maw

[Ma (**X, XI**)... Ma (*F. S.* I) ... Mh... OΣ (**IX**)... Δ (1125, 2194) ... Δ (**I, II**)... Flm ... Giacomelli (**III**)... Sk^2... Pt... Se ... Per ... Per (2685) ... Hl (*Wash. Obsns.* 1884) ... Hl (**II**) ... Lv^1 ... Cin^5 ... Glasenapp (**I**) ... T (2898) ... Big (*Bul. Ast.* **XII**, 299) ... Pritchett (*A. J.* 397) ... Brown (3646) ... Maw (**III**)...]

22 40 **8026.** **Hu 672.** With a later measure the mean is:

1904.38	62°0	4″18	2*n*	Hu

[Hu (*Bul. L. O.* No. 57)...]

22 42 **8027.** **H 2806.** The Decl. in H is 20′ too large. This star is noted, "duplex, Cl. II" in O. Arg. S.

1879.11	195°5	8″59	3*n*	Cin	8.0...9.0
1904.52	192.4	8.56	3*n*	Miller	8.4...8.9

[Cin^4... Cin^5... Cin^6.... Wilson (Cin^{10})...]

23 4 **8028.** **Σ 2170.** No change.

1867.82	74°9	3″69	4*n*	Δ
1897.56	71.1	3.78	2*n*	Gla
1905.72	69.6	3.55	1*n*	β

Ma (*F. S.* I) ... Ma (**XI**)... Se ... Δ (**II**)... Glasenapp (**V**)...β^6...]

23 4 **8029.** **See 332.** Later measures:

AB	1899.61	190°6	7″57	2*n*	Cg
AC	1899.61	358.6	16.06	2*n*	Cg

[See (*A. J.* 431) ... Cogshall (*A. J.* 505) ...]

8030. **Ho 416.** Fixed. $23^m\ 10^s$

1904.43	94°8	4″02	3*n*	Doo
1904.58	94.1	4.85	3*n*	Duncan
1905.75	98.5	4.25	1*n*	β

[Ho (3234)...β^6...]

8031. **β 1089.** Discovered with the 12-inch. There is some change in the angle. The following are all the measures: 23 22

1888.64	365°2	0″95	3*n*	β
1897.52	354.6	0.92	3*n*	A
1899.58	352.2	0.78	3*n*	A
1900.91	348.4	0.80	4*n*	Doo
1905.38	352.1	0.87	6*n*	Doo

[β (**XV**)... β (2929) (*Pub. L. O.* **II**) ... A (3465, 3639)... Doolittle (*Pub. Flower Obsy.* **I, II**) (*A. J.* 547)...]

8032. **Σ 2169.** (= **H** 5446.) Unchanged. 23 28

1867.82	93°2	14″71	4*n*	Δ
1890.50	96.7	13.98	2*n*	Gla

[Ma (*F. S.* I)... Ma (**XI**)... Mh... Δ (**II**)... Cin^5... Glasenapp (**I**)...]

8034. **A. G. 209.** Double in *A. G. Lund.* Measures by β^6. 23 37

8036. **Σ 2172.** Unchanged. 23 44

1868.29	171°8	11″52	4*n*	Δ
1905.31	170.6	11.56	2*n*	β

[Ma (*F. S.* I)... Ma (**XI**)... Mh... Δ (**II**)...β^1...β^6...]

8037. **Innes 105.** From his *Catalogue of Southern Double Stars.* In *Annals of the Cape Observatory* II, 77, he states that the measures given for this, as printed in Part I of this catalogue, belong to a star $1^m\ 25^s$ *f.* In the Lowell list, these measures are credited to See 330 (No. 8024). 23 55

[Innes (3406) (*Mon. Not.* **LVII**, 533)...]

8038. **Σ 2173.** *Ophiuchi* **221.** **B. A. C. 5910.** A rapid binary system. Since the measures of Σ more than one revolution has taken place. The apparent orbit is an elongated ellipse, with the principal star near the center. The system has a considerable proper motion: 24 14

Stumpe	0″204	in	227°4
Porter	0.221	in	225.3

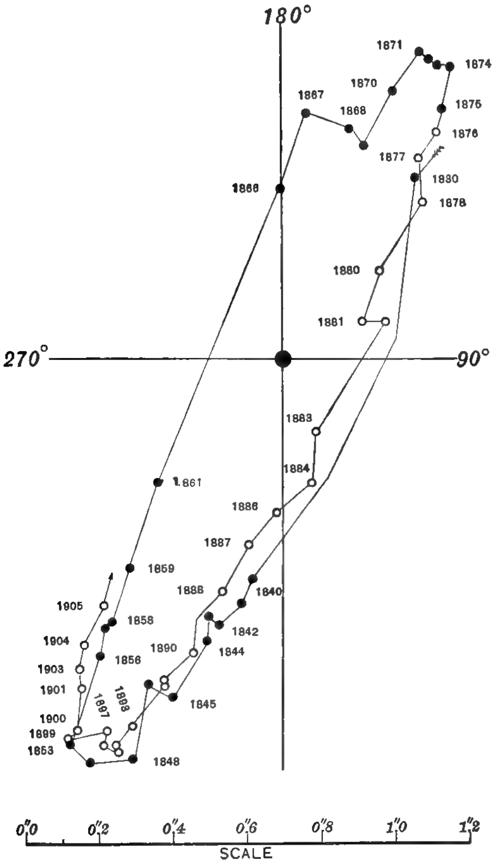
Three orbits have been found:

1876	Dunér	45.43 yrs.	*Mesures Microm.*, p. 221
1877	Lewitzky	45.35	*A. N.* 3330
1895	See	46.0	*Evolution of the Stellar Systems*

The following mean results are shown on the diagram:

1830.84	143°8	0″62	5*n*	Σ
1840.56	352.9	0.61	4*n*	OΣ, Da
1841.54	350.6	0.68	6*n*	OΣ, Da, Ma
1842.59	346.6	0.75	6*n*	Da, Ma
1843.50	343.9	0.73	16*n*	OΣ, Da, Ma, K

1844.36	345°0	0″8 ±	3n	Ma
1845.55	342.1	0.97	1n	Ma
1846.46	337.7	0.96	10n	OΣ, Ma
1848.08	339.5	1.16	5n	Ma, Da, Mh
1851.85	334.6	1.22	8n	Ma
1853.89	331.3	1.20	7n	OΣ, Ma
1856.65	328.5	0.95	9n	Δ, OΣ, Se
1857.43	326.9	0.88	1n	Se
1858.58	327.1	0.86	5n	Ma, Se, Morton
1859.33	324.2	0.71	3n	OΣ
1861.63	315.2	0.48	1n	OΣ
1866.32	180.7	0.47	3n	OΣ
1867.19	174.5	0.68	1n	Du



Σ 2173

1868.48	163°7	0″66	8n	OΣ, Δ, Du
1869.76	159.1	0.63	7n	Δ, Du
1870.49	157.6	0.80	10n	Δ, Du, Gl
1871.54	155.7	0.93	8n	Δ, Du
1872.35	154.0	0.92	8n	Δ, OΣ
1873.56	152.5	0.92	4n	Δ, Du, WS
1874.59	150.1	0.93	9n	Δ, OΣ, Gl, WS, Newcomb
1875.59	147.6	0.82	16n	Δ, Sp, Du
1876.55	146.0	0.76	12n	Δ, Sp, Hl
1877.60	146.0	0.67	14n	Δ, Sp, Do
1878.97	138.7	0.58	16n	Δ, Do, Sp, Cin
1880.56	132.6	0.36	10n	Sp, β
1881.51	114.9	0.24	3n	β
1882.57	109°9	0″3	7n	Sp
1883.88	24.8	0.22	9n	En
1884.59	13.6	0.35	5n	Hl, Per
1886.58	357.6	0.42	21n	Hl, Per, Sp, En
1887.45	349.7	0.52	15n	Sp, HΣ, T
1888.74	345.4	0.66	10n	HΣ, Hl, Lv
1890.59	343.1	0.84	3n	Maw
1891.59	340.0	0.94	8n	Hl, β, Big
1892.65	340.2	0.95	15n	Sp, Big, Com, Maw
1893.68	338.0	1.08	3n	Sp
1894.54	336.8	1.15	2n	Lewis
1895.45	337.5	1.16	6n	Com, See
1896.62	335.4	1.16	8n	Com, Gr. Obsy., Morgan
1897.61	334.8	1.12	14n	Maw, Gla, Brown, Doo, Do
1899.02	330.8	1.19	18n	A, Doo, Gr. Obsy., Coleman
1900.56	331.2	1.16	14n	Doo, Do, Lohse, Bryant
1901.95	328.9	1.05	11n	Bryant, Lohse
1903.51	326.9	1.01	15n	Doo, Do. Lohse, Biesbroeck
1904.68	325.3	0.95	2n	Lohse
1905.41	324.4	0.83	7n	Doo

In 1883 Wilson (Cin^{10}) thought he detected a third star about 7″ distant in the direction of 291°, but as the 36-inch failed to show it in 1890, and as it has not been seen with any large aperture, it is practically certain that it does not exist.

[Ma (*F. S.* **I**)...Ma (430)...Ma (**IX, X, XI, XIII, XV**)...Σ^{1}...Mh...Bp...Da^{3}...Wr...Wn (**V**)... Wn (1738)... K (1519)... Se... Se^{1} (called Σ 2175)...Se (*Comp. Rend.* **XLVIII**, 375)...Hd ... Ba (**II**)... Du... Flm... OΣ (**IX, X**)... Δ (1175, 1736, 1799, 1888, 1979, 2081, 2193)... Δ (**I, II**)...WS ...WS^{2}... Gl... Sk... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2198, 2242, 2433, 3466, 3680, 3931)...En (1518, 2677, 2742, 2786)...Sp (2133)...Sp (**I, II, II** App., **III**)...Hl (*Wash. Obsns.* 1881, 1884, 1886)...Hl (**I, II**)...Giacomelli (**III**)...Cin^{4}....Cin^{5}....Cin^{6}....O. Stone (2201)....Wilson (Cin^{10}).... Lv^{1}....T (2898, 3185) ... Per... Per (2529, 2685) ... Jones (*A. J.* 312) ... Glasenapp (**I, V**) ... Maw (**I, II, III**) ... β^{3} ... β^{4} ... β (3048, 3114)(*Pub. L. O.* **II**) ... Callandreau (*Bul. Ast.* **XII**, 523)...Big ...Big (*Bul. Ast.* **XII**, 299)...Everett (*Mon. Not.* **LVI**, 464)...Com (**X**)...Lewitzky (3330)(*Ueber die Bahnbestimmung der Doppelsterne*, St. Petersburg, 1879)... Lv (*A. J.* 382)... Pritchett (*A. J.* 397)...Morgan (*A. J.* 439)... Brown (3646)... Solá (3529, 3679)... A (3585, 3639)....HΣ (**XII**)....Coleman (*Mem. R. A. S.* **LIV**).... Biesbroeck.... Doolittle (*A. J.* 416, 547)(*Pub. Flower Obsy.* **I, II**) ... See (3311, 3314)(*A. J.* 349, 378) (*Evolution of the Stellar Systems*)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...]

8039. **H** 590. "Small star blue." In O. Arg. S. 8 m. 24m 15s

1879.45	312°0	35″60	2n	Cin	6.5...10.0
1890.51	311.4	35.75	2n	Gla	8.0... 9.3

[Cin^{5}...Glasenapp (**I**)...]

8040. Σ 2177. Fixed. 24 26

1868.10	134°6	3″38	4n	Δ
1905.28	135.3	3.19	1n	β

[Ma (*F. S.* **II**)...Ma (**XI**)...Δ (**II**)...Cin^{5}...β^{6}...]

8041. OΣ 330. Fixed. 24 29

1866.79	57°5	14″05	3n	Δ
1898.48	57.4	14.58	3n	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

24^m 35^s **8043.** **Hn 29.** No change.

1888.61	229°4	1″58	3*n*	Com
1904.73	231.9	1.40	4*n*	Doo

[β^4...Com (**VI**)...See (3496)...]

24 58 **8045.** **Σ 2174.** Without change.

1880.39	331°4	5″36	1*n*	β
1905.28	332.3	5.03	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)...Δ (1736)...β^3...β^6...]

25 ± **8046.** **O. Stone 35.** From Cin^5. Approximate place.

25 0 **8047.** **Σ 2175.** Without change. The measure in Se^1 belongs to Σ 2173.

1866.17	9°9	13″11	3*n*	Δ
1905.28	10.1	13.23	1*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...β^1...β^6...]

25 11 **8049.** **Σ 2178.** (= **S** 690.) Fixed. H noted, "close star suspected," but no third star could be seen either with the 6-inch, the 18½-inch, or the 40-inch, and there is now no probability of any such star existing.

1865.84	130°5	10″46	3*n*	Δ
1903.34	129.0	10.66	2*n*	β

[Ma (*F. S.* **I**).. Ma (**XI, XIII**)... H^1... Wr... Δ (**II**)...β^1... *Annals Toulouse Obsy.* **III**...β^6...]

25 14 **8050.** **Ho 417.** No sensible motion.

1896.51	153°5	0″24	2*n*	Ho
1904.47	154.4	0.43	3*n*	Doo

[Ho (3234, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

25 26 **8051.** **Ho 68.** Probably fixed.

1896.59	249°6	1″42	2*n*	Ho
1903.91	251.2	1.47	3*n*	Doo

[Ho (2778, 3558)...]

25 27 **8052.** **Σ 2176.** Without change.

1867.44	10°9	16″59	3*n*	Δ
1905.25	11.8	16.54	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...Δ (**II**)...Cin^5...β^6...]

25 45 **8053.** **Hu 673.** The place given in Part I is for 1900.

[Hu (*Bul. L. O.* No. 57)...]

25 46 **8054.** **H 4960.** Probably fixed.

1879.46	92°3	6″18	5*n*	Cin	8.5...9.0
1890.49	94.8	5.76	2*n*	Gla	9.2...9.4

[Cin^5...Glasenapp (**I**)...]

26^m 2 **8055.** **OΣ 331.** Probably some change in the angle.

1843.37	332°9	0″80	2*n*	Ma
1848.33	326.3	0.85	3*n*	OΣ
1857.05	335.9	0.83	2*n*	Se
1868.36	333.0	0.92	4*n*	Δ
1884.47	337.7	1.13	4*n*	Per
1886.55	336.2	0.94	3*n*	Hl
1898.42	338.6	1.03	3*n*	Hu
1900.48	340.7	1.12	5*n*	Doo
1903.49	339.3	1.08	3*n*	β

There is a distant companion, of which the following are all the measures:

1898.28	240°8	50″96	2*n*	Doo	...11.0
1903.50	240.6	51.00	1*n*	β	...10.0

Lewis measures a pair of small stars about 1^m *p* and 3′ *n* OΣ 331:

1896.58	13°7	0″78	1*n*	Lewis	10.0...12.0

The only pair I could find on one occasion is about 1^m *p* the OΣ pair, but description does not agree:

1903.48	165°5	2″62	1*n*	β	11.5...11.5

[Ma (**XI**)....OΣ (**IX**)....Δ (**I**)....Se....Hd....Per....Per (2685)....Hl (*Wash. Obsns.* 1886)....Hl (**II**).... Glasenapp (**IV**) .... Brown (3646).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXIII**, 403; **LXIV**, 802).... Maw (**III**) ...Do (3680)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I, II**)... HΣ (**XII**)...β^6...]

26 3 **8056.** **Hu 179.** Double in *A. G. Leipzig.*

1904.32	49°8	2″01	3*n*	Miller

[Hu (*A. J.* 485)...Miller (4022)...Biesbroeck...]

26 5 **8057.** **Σ 2180.** (= **H I. 66.**) Fixed. The proper motion is 0″035 in 270° (*A. G. Harvard*).

1868.59	264°3	3″14	4*n*	Δ
1881.56	264.5	3.20	3*n*	Sp
1902.46	264.0	3.40	2*n*	Hu

[Ma (324)...Ma (*F. S.* **I**)...Ma (**X, XI**)...H^1...Se...Wr...Ra (**XXIII, XXIX**) ...Bl (**V**)...WS...Gl...Du...Δ (1032)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**) ...Sp (**II**)...Glasenapp (**III**)...Knorre (3518)...*Annals Toulouse Obsy.* **III**... Espin (*Mon. Not.* **LXIV**, 677)...]

26 37 **8058.** **β 1201.** Discovered with the 36-inch. Angle apparently increasing. These are all the measures:

1890.49	338°2	0″43	3*n*	β
1898.62	340.4	0.43	3*n*	A
1899.51	343.3	0.31	1*n*	Bryant
1901.33	347.2	0.50	1*n*	Doo

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3585)...Bryant (*Mon. Not.* **LX**, 508)... Doolittle (*Pub. Flower Obsy.* **II**)...]

27 7 **8059.** **Σ 2181** *rej.* H^1 gives 288°0 : 6...9 (1828.5), but I found magnitudes as in Σ; distance about 25″ (1876).

1904.61	306°4	26″79	3*n*	Miller	8.8... 9.8
1905.75	308.4	26.79	1*n*	β^6	7.0...10.5

27m 29s **8060.** **Σ 2182.** Without change.

1868.48	359°3	5″21	4*n*	Δ
1903.61	358.0	5.35	1*n*	Lewis

[Ma (**X, XI, XV**)...Ma (*F. S.* **I**)...Δ (**II**)...Lewis (*Mon. Not.* **LXIV**, 802)...]

27 43 **8062.** **β** *Draconis.* **β 1090.** The minute attendant to β *Draconis* was discovered with the 36-inch. It is beyond the reach of all but the largest refractors. Auwers' latest value of the proper motion of the bright star is 0″0196 in the direction of 290°9. This movement is small, but if the small star was fixed in space, it would increase the position-angle 2°5 in the interval between 1889 and 1898. The measures do not seem to indicate any such change in the direction of the companion, and the probabilities are that it is moving with the primary. The following are all the measures:

1889.26	13°4	3″97	4*n*	β
1890.34	12.8	4.18	3*n*	β
1891.31	12.3	4.06	3*n*	β
1892.32	13.7	4.04	3*n*	β
1898.31	12.2	4.27	4*n*	β

[β (**XV**)...β (2929, 3048, 3114, 3142)...β (*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

28 6 **8063.** **H 4964.** The following are all the measures:

1879.36	226°4	53″46	1*n*	Cin	6.0...9.0
1889.99	225.5	54.12	4*n*	Gla	5.4...9.1
1904.88	225.7	53.60	2*n*	β	...9.0

[Cin^5...Glasenapp (**I, III**)...β^6...]

28 51 **8065.** 54 *Ophiuchi.* **Σ 2184.** (= **H III. 35**). No material change. The principal star has a proper motion of 0″070 in 224°8 (Auwers).

1867.95	74°6	21″58	4*n*	Δ
1904.68	71.9	21.23	3*n*	Miller
1905.55	71.8	21.70	2*n*	β

Δ (**II**) ...*A. G. Leipzig*, p. 210...β^6...]

28 52 **8066.** **Glasenapp 7.** From Glasenapp (IV).

1904.63	244°1	8″62	3*n*	Miller	8.8...10.6

28 55 **8067.** 53 *Ophiuchi.* **Σ 34, App. I.** (= **H V. 30 = Sh 249 = OΣ (App) 155**). Fixed. The principal star has a proper motion of 0″061 in 255°8 (Auwers).

1868.83	190°8	41″29	7*n*	Δ
1905.34	191.2	41.11	2*n*	β

[Da^3...Se^1...Ra (**XXI, XXVI, XXXIV, XXXV, XXXVIII**)...En...Pl...WS...En (1518)...Je (2340)...Δ (**II**)...OΣ (**X**)...Glasenapp (**I, III**)...β^6...]

28 56 **8068.** **Σ 2185.** (AC = **OΣ (App)** 154. The distant star, which was not measured by Σ, has a large proper motion.

C = 0″578 in 309°3 Porter
0.617 in 306.0 Glasgow
0.632 in 304.7 Furner
A = 0.070 in 210.8 Porter
0.062 in 216.3 Furner

There is no relative motion in A and B.

1869.86	5°4	27″61	7*n*	Δ
1885.19	4.9	27.79	5*n*	Hl
1896.56	4.7	27.82	2*n*	Hu
1905.33	5.5	27.66	2*n*	β

The measures of C in 1864 and 1905 give for the apparent movement of that star 0″689 in 316°1. This larger value of the proper motion is explained by the motion of A during the interval.

The following are all the measures of the distant star:

1864.51	190°4	97″09	1*n*	Δ
1874.01	193.5	93.63	2*n*	Δ
1877.09	194.6	92.73	2*n*	Δ
1878.58	195.3	92.43	2*n*	Δ
1884.56	197.5	90.30	2*n*	Hl
1885.61	198.0	90.05	3*n*	Hl
1893.63	201.1	87.74	2*n*	Eng
1905.33	206.0	84.88	2*n*	β

[Δ (**II**)...Δ (2195)...Flm...Pt...Hl (*Wash. Obsns.* 1884–85)...Hl (**II**)...Grant (*Mon. Not.* **XLIII**, 143).... Hu (*A. J.* 397) .... Furner and Storey (*Mon. Not.* **LXIV**, 477)...β^6...]

8069. **Σ 2183** *rej.* From H (VIII). The following are all the measures: 29m 5s

A and B

1879.49	162°7	27″29	1*n*	Cin	8.0...11.5
1905.22	163.0	28.00	1*n*	β	...12.3

A and C

1848.61	11°7	30″17	1*n*	Mh	6.8... 8.8
1879.45	13.4	28.59	4*n*	Cin	7.7... 9.3
1904.88	13.1	28.30	2*n*	β	...10.8

[Mh...Cin^5...Cin^6...β^6...]

8070. **H 1300.** The only measures are by Miller at the Kirkwood Observatory: 29 30

AB	1904.66	285°7	13″50	3*n*	M	9.3... 9.8
BC	1904.70	190.0	3.82	4*n*	M	...10.5

8071. **OΣ 332.** Fixed. 29 30

1866.90	112°1	10″13	3*n*	Δ
1898.52	110.8	10.45	3*n*	Hu

[Ma (**XI**)....OΣ (**IX**) .... Δ (**I**) .... Ba (**II**)....Glasenapp (**IV**).... Hu (*Pub. L. O.* **V**)....]

8072. **Hu 751.** With a later measure the mean is: 29 37

1903.48	328°7	0″30	2*n*	Hu	8.0...8.2

[Hu (*Bul. L. O.* No. 65)...]

8073. **Σ 2189** *rej.* A and C are DM (47°) 2532 and and 2533. The only other measures are: 29 37

1900.53	98°5	20″58	2*n*	Espin

[β^5...Espin (3717)...]

29^{m} 44^{s} **8074.** **Σ** 2187. Unchanged.

1867.24	175°.7	3″.09	3*n*	Δ
1895.50	178.5	3.06	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^{5}....Glasenapp (**IV**)...]

29 45 **8075.** **Σ** 2186. Unchanged.

1866.16	82°.0	2″.78	3*n*	Δ
1890.32	80.8	2.61	5*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Ra (**XXV**)...Giacomelli (**III**)...Du...Δ (1209)...Δ (**I, II**)...WS^{2}...Pt...O. Stone (2201)...Sp (**II**)...Glasenapp (**I, III**)...Knorre (3518)...*Annals Toulouse Obsy.* **III**)...]

29 48 **8076.** ν^1 and ν^2 *Draconis.* **Σ** 35, **App. I.** (= **H** V. 11 = **Sh** 250 = **OΣ** (**App**) 156.) There has been no relative motion since the measures of Struve. The meridian observations make a slight difference in the proper motions of the two stars, but this does not seem to be supported by the direct measures.

A (ν^2 *Draconis*) = 0″.159 in 71°.3 Auwers
0.159 in 75.4 Bossert
B (ν^1 *Draconis*) = 0.153 in 70.9 Auwers
0.162 in 72.0 Bossert

1857.22	312°.8	61″.86	5*n*	OΣ
1869.75	313.4	61.84	6*n*	Δ
1886.62	312.3	62.02	2*n*	Eng
1899.79	312.0	62.06	3*n*	Hu

[Ra (**XXVI**)... Schur (2255)... Pk... Bl (**V**)... Je (2340)... Franz (2649)... En (2662)...Δ (**I**, p. 412, **II**)... OΣ (**X**)... Belopolsky-Wagner (2888) parallax... Engelhardt (**II**)...Maiebckato (*Obsns.* 1892)...Glasenapp (**I, IV**)...**Hu** (*Bul. L. O.* No. 44)...Espin (*Mon. Not.* **LXIV**, 678)...]

30 · **8077.** **Σ** 2248 *rej.* Nothing since Struve but the following:

1902.47	232°.2	31″.66	1*n*	Hu

30 24 **8078.** **Σ** 2188. Fixed.

1867.80	205°.4	5″.32	4*n*	Δ
1895.51	205.2	5.35	2*n*	Gla

[Ma (**XI**)...Ma (*F. S.* **I**)...Se...Δ (**II**)...Glasenapp (**IV**)...]

30 25 **8079.** **Hu** 752. With a later measure the mean is

1903.48	329°.2	2″.67	2*n*	Hu	9.0...11.2

[Hu (*Bul. L. O.* No. 65)...]

30 29 **8080.** **Hn** 30. No motion.

1904.88	111°.1	3″.25	6*n*	Doo

[β^{4}...Lv^{1}...Com (**VI**)...]

30 51 **8081.** **H** 2807. "Very fine." I could not find this with the Hanover 9.4-inch; nothing so bright in this place. It is undoubtedly identical with Σ 2190.

8082. **Σ** 2190. (= **H** 2807.) There is an error in the Decl. of H 2807 (see preceding pair). There seems to be an error of 10° in the angle of Σ, although his value is apparently supported by the single measure of Ma. There is no evidence of change in the last forty years. 30^{m} 52^{s}

1830+	22°.4	8″ ±	1*n*	H
1843.73	33.7	10.17	1*n*	Ma
1864.65	23.7	10.09	6*n*	Δ
1878.49	23.9	10.16	1*n*	β
1884.56	24.0	10.40	2*n*	Hl
1896.56	23.2	10.62	2*n*	Hu
1903.48	23.2	10.12	3*n*	Do
1904.61	22.5	10.32	3*n*	Doo
1905.55	23.7	10.24	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Δ (1474)...Kn...WS^{2}...Sk^{2}...Hl (*Wash. Obsns.* 1884)... Hl (**II**)... β^{1}... β (*Mon. Not.* **XXXIV**, 377)... Flm... Searle (*A. J.* 299)...Hu (*A. J.* 397)...Glasenapp (**IV**)...HΣ (**XII**)...Boeger (*A. J.* 522)... Sk^{5}... Do (3931)... Lewis (*Mon. Not.* **LXIV**, 802)... Doolittle (*Pub. Flower Obsy.* **II**)...β^{6}...]

8083. **OΣ** 333. Description from *Poulkowa Catalogue* of 1850, but not subsequently seen double by OΣ. The only other evidence in favor of duplicity are three uncertain observations by Ma: 166°.4 (1843.34) 2*n*, and 154°.0 : 0″.2 ? (1845.55) 1*n*. On the other hand, it was found single by Δ in 1865, by β in 1876–78, doubtful by Per in 1884, and single by Hu with the 36-inch in 1898. There is very little probability of its being a close pair. 31 13

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**, p. 229)...β^{1}... Per... Per (2685)... Hu (*Pub. L. O.* **V**)...]

8084. **Hn** 137. No other observation. 31 17

[Hu (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

8085. **Hn** 31. The later measures indicate some change. 31 44

1888.60	332°.0	1″.90	3*n*	Com

[β^{4}...Com (**VI**)(*Sid. Mess.* **IX**, 78)...]

8086. **β** 1121. Discovered with the 36-inch. Change uncertain. This is 2^{m} 30^{s} *f* and 2′.5 *s* of *α Ophiuchi.* 31 52

The following are all the measures·

1889.14	240°.1	0″.71	3*n*	β
1892.64	242.4	0.69	6*n*	Sp
1895.67	236.0	0.61	3*n*	A
1897.00	248.0	0.66	2*n*	Lewis
1897.56	244.2	0.73	2*n*	Bowyer
1897.71	240.8	0.64	3*n*	A
1899.90	234.9	0.58	3*n*	Lewis
1901.42	238.0	0.76	3*n*	Doo

[β (**XVI**)....β (2956)....β (*Pub. L. O.* **II**)....Sp (**III**)....A (*A. S. P.* **VII**, 305) (*A. J.* 429)...Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486)...Doolittle (*Pub. Flower Obsy.* **II**)...]

32^{m} 3^{s} **8087.** **β 960.** Discovered with the 18½-inch. These are all the other measures:

1891.56	301°2	2″98	3*n*	β	8.3...12.4
1898.52	297.7	3.44	3*n*	A	8.0...11.8
1898.64	294.2	3.54	2*n*	Brown	
1901.44	300.1	3.41	4*n*	Doo	

[β (**XIII**)...β3...β (3114) (*Pub. L. O.* **II**)...A (3585)...Brown (3646)...Doolittle (*Pub. Flower Obsy.* **II**)...]

32 14 **8088.** Noted as "double" in the Harvard Zones. The place is that of the 9.2 m star, DM (0°) 3739. The 40-inch shows no companion of any kind.

[β5...]

32 43 **8090.** **Ho 418.** The only other measures are:

1904.16	286°1	16″77	4*n*	Doo

[Ho (3234)...]

32 49 **8091.** **A. G. 210.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546).

33 ± **8092.** **𝕳 III. 40.** "Unidentifiable" in H, and no Decl. given. The description corresponds to Σ 2178, but that pair does not agree as to Decl. with the remark in 𝕳 that this pair is "between λ and μ *Herculis.*" 𝕳 measured the angle 4*n*, and distance 1*n*. The chances are, however, that it is Σ 2178.

33 5 **8093.** **Sh 251.** (= σ 550.) No change in the principal stars. Magnitudes in OΣ, 6.5...8.5. The following are all the later measures:

A and B

1859.51	328°3	111″41	2*n*	OΣ
1877.51	328.6	111.31	3*n*	Doubiago
1903.46	328.2	111.19	4*n*	β

A and C

1903.46	18°2	132″05	4*n*	β

[OΣ (X)...β6...]

33 25 **8094.** **Σ 2191,** (BC = **Ho 419.**) C was added by Hough. No motion.

A and B

1866.92	268°0	26″35	4*n*	Δ
1894.62	267.4	26.61	2*n*	Ho
1902.57	267.8	26.54	4*n*	Doo

B and C

1902.57	31°6	8″28	4*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XI**)... Mh ... Ra (**XXV**)... En... Δ (1209) ... Δ (**I, II**) ... Giacomelli (**III**) ... Cin5...Cin6...Wilson (Cin10)... Je (2369) ... T (2898)... β3 ... Glasenapp (I) ... Scott (*Brit. Ast. Ass'n* **V**, 75) ... Ho (3234, 3558) ... *Annals Toulouse Obsy.* **III**...Doolittle (*Pub. Flower Obsy.* **II**)...]

8095. **β 961.** (= **β 963.**) Discovered with the 18½-inch. Two minute stars, more distant, in the same quadrant. In Gould 7.1 m. The later measures are: 33^{m} 32^{s}

1892.37	141°6	8″13	3*n*	β
1901.58	139.9	8.15	4*n*	Doo

[β (**XIII**)....β3.. ..β (3142) (*Pub. L. O.* **II**).... Doolittle (*Pub. Flower Obsy.* **II**) (*A. J.* 547)....]

8097. **Ho 420.** Unchanged. 33 37

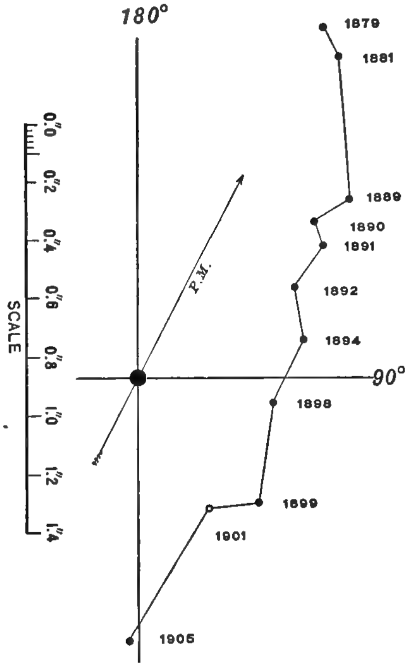
1904.46	100°1	1″01	3*n*	Doo

[Ho (3234)...]

8098. **H 1301.** The only later observation is: 33 44

1903.48	95°3	8″64	2*n*	β6	10.5...10.7

8099. 26 *Draconis.* **β 962.** Discovered with the 18½-inch. The principal star has a proper motion of 0″583 in the direction of 152°7 (*A. G. Bonn*), and it was therefore certain, at the time of my second set of measures in 1881, that this was a binary system from the common proper motion of the components. The apparent orbit appears to be a very elongated ellipse. There is nothing in the measures to show the extreme distance of the companion in the second and fourth quadrants. 33 45



26 Draconis. β 962

1879.39	148°9	1″31	1*n*	Cin
1879.97	151.8	1.37	4*n*	β
1881.53	148.1	1.31	3*n*	β
1889.42	130.1	0.95	4*n*	β

1890.37	131°5	0″81	3*n*	β
1891.33	125.7	0.78	3*n*	β
1892.41	119.9	0.62	2*n*	β
1894.19	102.7	0.58	1*n*	Barnard
1898.70	79.7	0.47	1*n*	A
1899.71	44.1	0.59	1*n*	A
1901.53	28.6	0.5 ±	1*n*	A
1905.45	357.7	0.89	3*n*	A

[β (**XIII**)... β^3... β^4... β (2957, 3048, 3141, 3142)(*Pub. L. O.* **II**) ... β (*Sid. Mess.* **VIII**, 356).... Cin^6.... Barnard (*A. J.* 447).... A (3639) .... Doolittle (*Pub. Flower Obsy.* **II**)...]

(See p. 1079)

$33^m\ 47^s$ **8100.** **β 631.** *Ophiuchi* 255. Discovered with the 18½-inch. In Gould 6.4 m. Lalande 32200. The following are all the measures:

1879.55	73°0	0″40	4*n*	β
1883.90	72.1	0.4 ±	7*n*	Sp
1886.65	65.8	0.36	7*n*	En
1887.62	62.3	0.37 ±	5*n*	Sp
1888.50	57.2	0.43	2*n*	Lv
1891.58	67.2	0.36	3*n*	β
1895.68	69.8	0.37	1*n*	Lewis
1896.69	33.3	0.97	1*n*	Dyson
1898.47	64.3	0.57	2*n*	Doo
1898.54	64.0	0.42	2*n*	β
1901.56	61.2	0.34	6*n*	Bryant
1903.57	63.3	0.44	3*n*	Biesbroeck
1905.44	61.4	0.38	2*n*	A

[β (**X**) ... β^1 ... β^3 ... β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**) ... Sp (II App.)... En (2786) .... Lv^1 .... Lv (*Sid. Mess.* **VIII**, 77) .... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403)... Biesbroeck...]

33 56 **8101.** **Ho 69.** No motion.

1904.46	142°2	1″70	3*n*	Doo

[Ho (2778, 3558)...]

34 14 **8102.** **See 336.** The later measures are:

1899.62	96°3	3″25	3*n*	Cg	9.2...12.5
1902.45	97.0	3.42	2*n*	Doo	

[See (*A. J.* 431)... Cogshall (*A. J.* 505)... Doolittle (*Pub. Flower Obsy.* **II**)...]

34 19 **8103.** **Hn 138.** No change.

1904.65	269°5	2″15	3*n*	Miller

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)... Boeger (*A. J.* 522)...]

35 ± **8105.** **Ħ III. 31.** "Unidentifiable." No Decl. given in Ħ. The absence of any further description makes it impossible to identify it with any certainty.

35 20 **8106.** **Hu 184.** First noted by Skinner with the Meridian Circle of the Naval Observatory.

1901.55	275°9	4″31	2*n*	β

[Hu (*A. J.* 485)... Boeger (*A. J.* 522)... β^5...]

8107. **Σ 2192.** *Herculis* 315. "Both red," H (IV). The change is obviously due to proper motion. Assuming that B is stationary, the measures by Σ, Δ, Hl, and β give 0″073 for the annual movement of the principal star in the direction of 172°1. $35^m\ 24^s$

1833.45	88°4	10″41	5*n*	Σ
1864.72	76.2	10.22	6*n*	Δ
1884.57	68.9	10.74	2*n*	Hl
1903.48	60.8	11.02	4*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... H (**IV**) ... WS ... WS^2... Flm... Sk...Gl ....Seagrave (*Sid. Mess.* **II**, 22) .... Hl (*Wash. Obsns.* 1884) .... Hl (**II**).... Δ (1572) ... Δ (**II**) ... Hu (*A. J.* 397) ... Bowyer (*Mon. Not.* **LX**, 508) ... HΣ (**XII**) .... Boeger (*A. J.* 522) .... Sk^5.... Do (3931).... Doolittle (*Pub. Flower Obsy.* **II**)... β^6...]

8108. **H 591.** Apparently unchanged. 35 26

1879.58	11°5	15″11	2*n*	Cin	8.7...9.7
1904.64	12.1	15.99	3*n*	Miller	

[H (**VIII**)... Cin^6...]

8109. **A. G. 211.** Double in *A. G. Berlin.* Measures by Cogshall (*A. J.* 546). 35 27

8110. **Arg. 30.** "Duplex" in O. Arg. Measures from Cin^6. 35 30

1904.67	291°5	36″47	2*n*	Miller

8111. **H 1302.** "Fine." 35 33

1879.38	325°4	3″5 ±	2*n*	Cin^6	11.0...11.0
1905.75	326.2	6.21	1*n*	β^6	11.0...11.0

8112. **Egbert 5.** From Cin^6. Not identified, and no other observation. Not found by me in measuring H 1302. 36

8113. **Σ 2193.** Without change. 36 5

1869.48	67°5	5″64	4*n*	Δ
1904.67	66.3	5.83	3*n*	Miller

[Ma (**XI**)... Ma (*F. S.* **I**)... Δ (**II**)...]

8114. **Σ 2194.** (= **Ħ III. 104 = S 691.**) Fixed. The measures by Lewis seem to belong to some other pair. The proper motions in *A. G. Berlin* are: 36 10

A = 0″056 in 345°8
B = 0.072 in 34.3

1869.39	8°0	16″12	5*n*	Δ
1894.59	7.4	16.28	2*n*	Gla
1897.55	7.5	16.45	3*n*	Coleman

[Ma (324)... Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Ra (**XXI**)... WS... Gl... Δ (**II**) ... Glasenapp (**I, III**) ... Engelhardt (**II, III**) ... *Annals Toulouse Obsy.* **III**... Lewis (*Mon. Not.* **LXIV**, 802)... Coleman (*Mem. R. A. S.* **LIV**)...]

36m 10s **8115.** **OΣ (App) 157.** These stars are W² XVII, 1150 and 1154.

1885.70	110°3	113″13	4*n*	Franz
1905.56	109.5	113.48	2*n*	β

[Δ (I)...Franz (3080)...β⁶...]

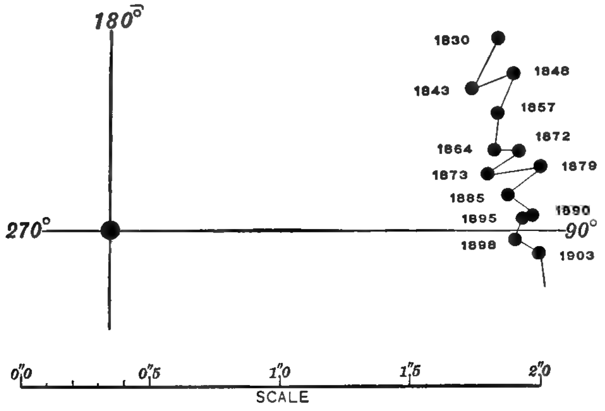
36 16 **8116.** **Σ 2195** *rej.* Measures from β⁵. This is in the field with, and nearly preceding, Σ 2196. The position from A of Σ 2196 is, 279°5 : 162″2 (1904.38).

36 17 **8117.** **Ho 421.** Unchanged.

1903.33	340°0	5″65	3*n*	Doo

[Ho (3234)...]

36 24 **8118.** **Σ 2199.** Slow motion in angle, with little or no change in distance. To this time the motion is practically rectilinear.



Σ 2199

1830.94	116°4	1″67	3*n*	Σ
1843.50	111.4	1.50	4*n*	Ma
1848.70	111.3	1.67	3*n*	OΣ
1857.64	106.9	1.56	2*n*	Se
1864.00	101.8	1.51	7*n*	Δ
1872.52	101.2	1.60	2*n*	OΣ
1873.57	98.7	1.47	2*n*	Δ
1879.47	98.5	1.67	3*n*	Hl
1885.59	95.2	1.54	3*n*	Hl
1890.55	92.0	1.63	2*n*	Gla
1895.62	91.8	1.54	2*n*	Collins
1898.33	88.9	1.56	3*n*	Doo
1903.65	87.2	1.65	2*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Se ... OΣ (**IX**) ... Δ (1194, 1674) ... Δ (I, **II**)...Flm ...WS...WS² ...Gl...Sk...Du...Seagrave (*Sid. Mess.* **II**, 22)... T (2898)...En (2677)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Glasenapp (I, (**III**).... Maw (**II, IV**)....Big (*Bul. Ast.* **XII**, 299) ....Collins (*A.J.* 378).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383)...HΣ (**XII**)... Sk⁵ ... Doolittle (*Pub. Flower Obsy.* **I**) ... Espin (*Mon. Not.* **LXIV**, 677)...Biesbroeck...]

8119. **Σ 2196.** Not measured by Dembowski. The only complete measures in the last half century are the following: 36m 27s

1897.65	257°5	3″10	3*n*	Doo
1902.48	258.8	3.78	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1736)...Cin⁵...Doolittle (*Pub. Flower Obsy.* **I**)...]

8120. **β 1251.** This pair was discovered with the 18½-inch at Chicago, but not included in any of the catalogues of new pairs issued at that time. This is a naked-eye star in *Ophiucus*; in DM 5 m; Heis 6 m; Harvard 5.7 m. The components have a common proper motion: 36 35

A. G. Berlin	0″121 in 350°4
Porter	0.115 in 360.0

Slow motion in angle.

1897.58	65°2	1″23	3*n*	A
1898.48	71.5	1.42	3*n*	Doo
1898.67	69.1	1.41	1*n*	Brown
1900.57	67.4	1.19	6*n*	Lewis
1901.48	65.1	1.30	4*n*	Doo
1905.40	62.4	1.46	6*n*	Doo

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3465)...Doolittle (*Pub. Flower Obsy.* **I, II**)(*A. J.* 547).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...]

8122. **O. Stone 36.** Probably fixed. 36 42

1903.53	205°8	7″62	3*n*	β	8.7...10.2

[Cin⁵...Pidoux (3751)...β (3908)...β⁶...]

8123. **A. G. 212.** Double in *A. G. Leipzig*, and measures from the same, p. 249. 36 47

8124. **Ho 559.** These are all the later measures: 36 50

1904.50	296°9	3″26	3*n*	Doo
1904.68	300.3	3.44	3*n*	Miller

[Ho (3557)...]

8125. **Σ 2197.** (= **H 2808.**) Probably fixed. Not measured by Dembowski. 36 55

1895.49	358°8	8″17	2*n*	Gla
1902.48	357.1	8.12	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1736)...Cin⁵... Glasenapp (**IV**)...]

8126. **Σ 2207.** No material change. 37 14

1869.38	125°3	0″92	4*n*	Δ
1902.41	122.6	0.78	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ...Δ (**II**)...Glasenapp (**III**)...Bryant (*Mon. Not.* **LX**, 508)...]

37^m 37^s **8127.** **Σ 2203.** *Herculis* 328. Some change is probable, but the measures are very conflicting.

1841.13	335°9	0″80	4*n*	OΣ
1854.51	332.2	0.85	2*n*	OΣ
1868.76	327.5	0.77	5*n*	Δ
1882.03	325.0	0.72	6*n*	Hl
1889.71	324.3	0.77	2*n*	HΣ
1895.56	327.3	0.53	2*n*	Gla
1901.16	319.3	0.66	3*n*	Lewis
1902.39	318.6	0.66	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... Se... Se (*Comp. Rend.* **XLVIII**, 375)... OΣ (**IX, X**)... Δ (*Mem. Accad. Sci.*)... Δ (1032, 2194) ... Δ (**I, II**) ... Flm ... Du ... Newcomb (*Wash. Obsns.* 1874)....Sp(2133)....Sp (**II**).... Per .... Per (2529, 2748)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383)...Glasenapp (**III, IV**)... Big (*Bul. Ast.* **XII**, 299)... HΣ (**XII**)...]

(See p. 1079)

37 27 **8128.** **OΣ (App) 158.** The place in OΣ is the same as that of Σ 2203. I could not find any wide pair, and Dembowski also failed to identify it.

37 49 **8129.** **Σ 2198.** Probably no change.

1869.25	27°2	7″40	5*n*	Δ
1905.54	25.7	7.33	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...β^6...]

37 56 **8130.** **See 337.** Later measures:

1899.51	10°7	9″70	3*n*	Cg	8.3...9.3

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

37 58 **8131.** **HΣ.** "Nova" in HΣ (XII). No change.

1902.57	51°1	15″54	2*n*	β^6	8.4...11.5

37 59 **8132.** **Σ 2200.** Without change.

1866.95	165°1	1″68	3*n*	Δ
1902.46	165.5	1.73	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X**)... Se... Δ (**II**)... Cin^5... T (3185)... Glasenapp (**I, IV**) ...*A. G. Leipzig*, p. 249...*Annals Toulouse Obsy.* **III**...]

38 16 **8133.** **A 233.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

38 24 **8134.** **Σ 2201.** Without change.

1865.94	302°5	7″42	3*n*	Δ
1902.40	302.5	7.82	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...T (3185)...]

38 28 **8135.** **Schj 15.** No. 21 of the list of new pairs in Schj (1485). Glasenapp (I) measures a distant 8.4 m star, 147°6: 138″19 (1890.46) 2*n*.

1904.42	355°2	55″34	2*n*	β^6

8136. 61 *Ophiuchi.* **Σ 2202.** (= **H** IV. 32 = **Sh** 252.) Relatively fixed. The large star has a small proper motion, 0″018 in 334°9 (Auwers). 38^m 33^s

1866.13	93°7	20″32	3*n*	Δ
1888.99	93.6	20.37	9*n*	Giacomelli
1902.41	93.5	20.65	3*n*	Hu

[Ma(*F. S.* **I**)...Ma (324)...Ma (**X, XI, XIII, XV**)... Mu... Fl...En...Ra (**XXII**) ....Ma (*Beiträge zur physichen Kenntniss der himmlischen Körper*, Weimar, 1841)...H (**VII**)...Hd...Du...WS...Sk^2...Giacomelli (**III**)...Pl... Δ (1209) ...Δ (**I, II**)...Schur (2255)...Je (2369)...Per...Per (2529)...Sp (**II**) ... Glasenapp (**I, III, IV, V**)...Hu (*A. J.* 397)... Solá (3529)...Do (3680)... *Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

8137. **H 1303.** The only measure is: 38 50

1904.43	150°1	37″90	2*n*	β^6	6.7...9.8

8138. **Ho 560.** A 12.5 m star, 256°: 53″. 39 2

1902.34	89°7	0″47	3*n*	Doo

[Ho (3557)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

8139. **Σ 2210.** Change in distance? 39 6

1866.71	122°4	2″86	3*n*	Δ
1902.39	122.2	3.21	3*n*	Hu
1904.64	121.8	3.40	3*n*	Duncan

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...] (See p. 1079)

8140. **Σ 2209** *rej.* Measures by Espin (*Mon. Not.* LXII, 532). 39 10

1905.58	127°6	29″58	1*n*	β^6

8141. **A 31.** A later position is: 39 15

1904.12	3°9	1″13	3*n*	β

[A (3635)... β^6...]

8142. **A 32.** (AC = **H** 4977). No measures of the Herschel star. 39 16

[A (3635)...]

8143. **OΣ 334.** Unchanged. 39 17

1867.26	356°2	14″97	4*n*	Δ
1898.51	356.0	15.16	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Du...Ba (**I**)...Δ (**I**)...Per...Per (2749)...Hu (*Pub. L. O.* **V**)...Kustner (3821)...]

8144. **Σ 2206.** Apparently without change. 39 18

1868.52	244°6	0″93	4*n*	Δ
1902.42	246.9	0.99	4*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X**)... Se... Δ (**II**)...Sp (**II**)...Cin^5...Ho (3558)...Bowyer (*Mon. Not.* **LX**, 508)...]

39^{m} 32^{s} **8145.** **Σ 2218.** Probably some change, but the measures are not very accordant:

1832.72	356°.7	2″.50	4*n*	Σ
1836.78	355.1	2.47	3*n*	Σ
1857.52	353.3	2.30	2*n*	Se
1868.41	351.6	2.22	4*n*	Δ
1872.34	352.1	2.08	4*n*	Du
1888.78	352.0	2.43	2*n*	T
1889.69	345.8	2.07	3*n*	Maw
1898.09	344.6	2.13	6*n*	Doo
1902.42	344.7	2.08	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{2}...Wr...Ra (**XXIII**)...Se...Se^{2}...Flm...Du...Δ (1194)....Δ (**I, II**)....Seagrave (*Sid. Mess.* **II**, 22)....Sk^{2}....T (2991)....Glasenapp (**I, III**)....Maw (**I, III, IV**)....Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)...Knorre (3300)...Hu (*A. J.* 397)...Bryant (*Mon. Not.* **LX**, 508)...Doolittle (*Pub. Flower Obsy.* **I**)...*Annals Toulouse Obsy.* **III**...Boeger (*A. J.* 522)...Espin (*Mon. Not.* **LXIV**, 677)...]

39 35 **8146.** **Σ 2204.** (= **Sh 253.**) Without change.

1866.23	25°.3	14″.38	3*n*	Δ
1902.40	24.7	14.62	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...H (**VIII**)...Mh...Ra (**XXIII**)...Hl (*Wash. Obsns.* 1863)...Hl (**I**, p. 133)...Δ (1194)...Δ (**I, II**)...Cin^{4}...Cin^{5}...Wilson (Cin^{10})...*Annals Toulouse Obsy.* **III**...]

39 45 **8147.** **Δ 16.** (AB = **Σ 2214.**) There is no change in the wide pair since Σ. In 1863 the smaller component was found by Dembowski to be a close pair, and at first it appeared to be in rapid movement, but the later measures show no sensible change.

B and C

1867.79	145°.3	1″.32	6*n*	Δ
1878.30	147.9	0.97	1*n*	β
1882.02	144.0	1.32	4*n*	Hl
1889.71	148.3	1.54	2*n*	HΣ
1891.32	145.5	1.36	3*n*	β
1902.43	143.7	1.21	3*n*	Hu

A and BC

1866.01	212°.9	19″.42	3*n*	Δ
1902.40	213.3	19.50	3*n*	Hu

[Δ (**II**)...OΣ (**IX, X**)...Ma (**XI**)...Ma (*F. S.* **I**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...β^{1}...β (3114) (*Pub. L. O.* **II**)...Sp (**II**)...Glasenapp (**IV**)...HΣ (**XII**)...Lewis (*Mon. Not.* **LXII**, 383; **LXIII**, 403)...]

39 53 **8148.** **OΣ 340.** There is some change in the angle, which OΣ has pointed out as the effect of precession.

1847.46	237°.2	31″.50	3*n*	OΣ
1867.19	234.8	31.52	3*n*	Δ
1879.32	233.2	31.64	1*n*	β
1886.67	231.5	31.58	3*n*	Je
1889.66	230.9	31.28	2*n*	T
1898.56	232.0	31.60	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Flm...β^{3}...T (3186)...Je (2772)...Glasenapp **IV**)...Hu (*Pub. L. O.* **V**)...]

40 5 **8149.** **Σ 2219.** Fixed.

1868.11	102°.7	17″.90	4*n*	Δ
1902.44	100.9	17.77	4*n*	Hu
1904.63	100.8	17.78	3*n*	Miller

[Ma (*F. S.* **II**)...Δ (**II**)...Glasenapp (**V**)...Espin (*Mon. Not.* **LXIV**, 677)...]

8150. **Σ 2208.** Some of the measures are discordant, but there is no change. 40^{m} 11^{s}

1830.48	275°.4	8″.63	2*n*	Σ
1848.58	273.8	9.28	1*n*	Mh
1866.88	274.9	9.10	3*n*	Δ
1902.42	274.3	9.30	3*n*	Hu
1903.97	275.4	9.30	4*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Wn (1738)...Δ (**II**)...Cin^{5}...Glasenapp (**I**)...β^{6}...]

8152. **Σ 2213.** (= **S 692.**) Without change. 40 19

1869.17	330°.9	4″.35	5*n*	Δ
1879.08	331.9	4.74	4*n*	Sp
1902.39	331.7	4.60	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...Se...Wr...Ra (**XXIII**)..Du...WS^{2}...Sk^{2}...Δ (1125, 1194)....Δ (**I, II**)....Sp (**II**)....Per....Per (2529)....Maw (**I**)....Glasenapp (**III**)...Collins (*A. J.* 378)...Hu (*A. J.* 397)...*Annals Toulouse Obsy.* **III**...Do (3931)...Lohse (*Pub. Potsdam Obsy.*)...]

8153. **Σ 2205.** There is some change in the angle, but the measures as a whole are discordant, particularly in distance. 40 24

1830.87	291°.0	2″.52	3*n*	Σ
1844.33	294.9	2.48	5*n*	Ma
1867.10	297.7	2.19	3*n*	Δ
1869.31	301.6	2.19	3*n*	Du
1878.62	305.1	2.30	1*n*	β
1883.50	303.6	2.28	2*n*	Per
1884.56	302.4	2.21	3*n*	Hl
1894.54	306.5	2.18	3*n*	Gla
1902.57	306.9	2.10	2*n*	β
1905.54	307.9	2.10	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Du...Δ (**II**)...Δ (2195)...Sk^{2}...β^{1}...En (2677)...Callandreau (*Bul. Ast.* **XII**, 523)...Per...Per (2529)...Hl (*Wash. Obsns.* 1884)...Hl (**II**)...Glasenapp (**I, III**)...Big (*Bul. Ast.* **XII**, 299)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)...Collins (*A. J.* 378)...Maw (**III**)...HΣ (**XII**)...Boeger (*A. J.* 522)...Do (3931)...Biesbroeck...]

8155. **Σ 2211.** The distance may be increasing. Glasenapp measures a distant 9.5 m star, 197°.8 : 104″.82 (1890.43) 2*n*. 40 27

1866.83	116°.4	10″.15	3*n*	Δ
1902.43	115.9	10.32	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Mh...Δ (**II**)...Cin^{5}...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...]

8156. **Σ 2212.** Fixed. 40 34

1867.16	339°.3	2″.98	3*n*	Δ
1902.44	340.6	3.20	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^{5}...T (3185)...Glasenapp (**I, III**)...*A. G. Leipzig*, p. 249...]

8157. **OΣ 335.** (= H 2809.) Fixed. 40 51

1866.52	140°.6	24″.94	3*n*	Δ
1898.45	139.8	25.16	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...H (**V**)...Ba (**I**)...Δ (**I**)...Per...Per (2685)...Hu (*Pub. L. O.* **V**)...]

41^m 3^s **8158.** **Ho 70.** The measures, taken together, show no change. The following are all the other observations:

1893.47	104°7	0″34	2*n*	Ho
1897.54	110.6	0.27	1*n*	Ho
1900.46	109.5	0.32	3*n*	Bryant
1901.42	104.0	0.53	3*n*	Lewis
1903.46	104.3	0.37	3*n*	Gr. Obsy.
1903.95	108.7	0.48	6*n*	Doo

[Ho (2778, 3234, 3558) .... Greenwich Obsy. (*Mon. Not.* **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIV**, 802)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

41 9 **8159.** **Σ 2216** *rej.* Measures from *A. G. Leipzig*, p. 249.

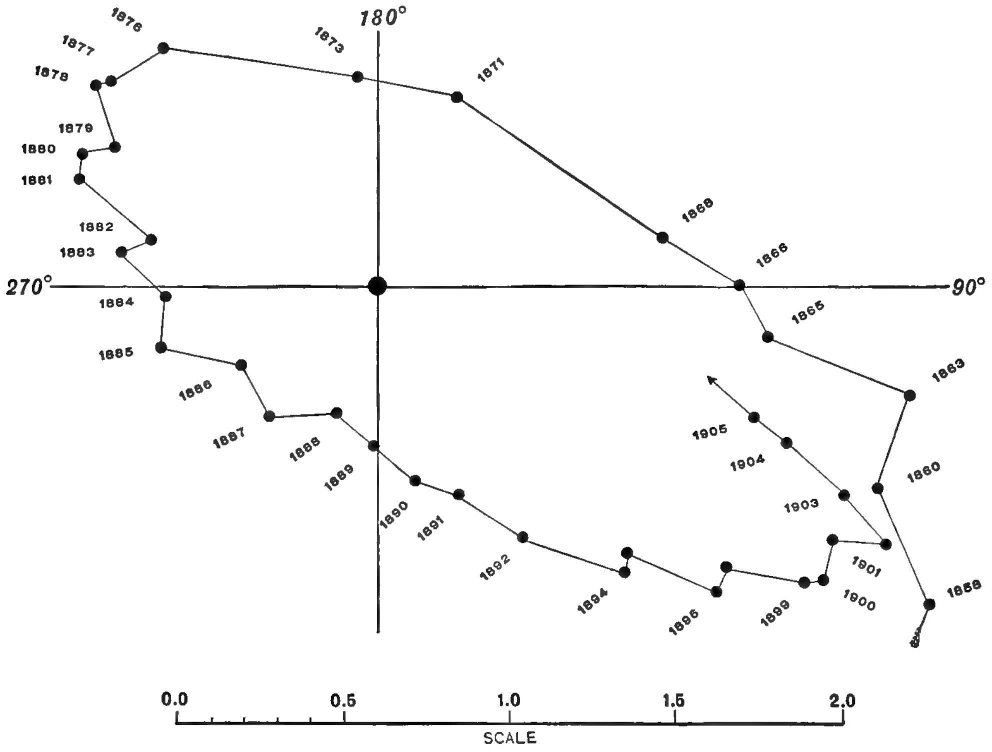
1902.44	27°1	27″49	3*n*	Hu
1904.72	25.9	26.84	3*n*	Cogshall

8162. *μ Herculis.* **A. Clark 7.** (AB = **Σ 2220** = **♅ IV. 41** = **S 693**.) The duplicity of the Herschel companion was discovered by Alvan Clark in 1856 with a 7¾-inch refractor. It was soon found to be in rapid motion, and has now completed more than one revolution since its discovery. 41^m 47^s

The following orbits have been found:

1878	Beebe	225. yrs.	*Am. Jour. Sci.*, July, 1879
1878	Doberck	54.25	*A. N.* 2287
1888	Celoria	40.65	*A. N.* 2949
1889	Leuschner	45.39	*Pub. A. S. P.* II, 46
1894	Hall	42.09	*A. J.* 324
1895	See	45.0	*Evolution of the Stellar Systems*

The observations which follow are shown on the diagram. The mean position is given of the measures in brackets.



μ **Herculis. BC**

41 14 **8160.** **Σ 2217.** Unchanged.

1864.87	284°5	6″59	3*n*	Δ
1902.43	284.3	6.35	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H 1...Se...Wr...Bp...Ra (**XXIII**)...Du...Ba (**II**)...Δ (1194)...Δ (**I, II**)...Cin 5...Glasenapp (**I, III**)...*A. G. Leipzig*, p. 210...*Annals Toulouse Obsy.* **III**...]

41 26 **8161.** **A. G. 213.** Double in *A. G. Lund.* Measures by β^6.

⎰1857.50	59°2	1″82	2*n*	Da
⎱1859.70	60.4	2.05	3*n*	Da
1860.30	67.7	1.64	1*n*	OΣ
⎰1862.83	78.5	1.50	1*n*	OΣ
⎱1864.43	77.6	1.80	1*n*	Da
1865.44	82.0	1.20	5*n*	Δ
1866.68	89.5	1.10	2*n*	OΣ
1868.50	98.7	0.88	1*n*	OΣ
1871.52	156.8	0.62	1*n*	OΣ
1873.50	185.5	0.63	1*n*	OΣ
⎰1876.60	228.7	1.01	4*n*	OΣ
⎱1876.68	216.0	0.83	4*n*	Δ

1877.62	229°9	0″92	4*n*	Δ
1877.89	235.6	1.13	3*n*	OΣ
1878.48	234.9	1.05	6*n*	β
1879.45	242.7	0.90	5*n*	β
1880.47	245.9	0.96	7*n*	β
1880.65	246.3	1.00	4*n*	Hl
1881.41	252.1	0.92	5*n*	β
1881.55	249.1	1.01	5*n*	Hl
1882.52	259.1	0.70	4*n*	Hl
1883.09	264.9	0.96	4*n*	OΣ
1883.53	262.1	0.74	3*n*	β
1883.58	262.9	0.66	3*n*	Hl
1884.64	273.4	0.65	3*n*	Hl
1885.55	284.7	0.77	2*n*	HΣ
1885.56	288.0	0.61	3*n*	Hl
1886.59	300.1	0.38	5*n*	Hl
1886.74	301.9	0.59	3*n*	HΣ
1887.58	321.5	0.42	3*n*	Hl
1887.63	320.6	0.62	3*n*	HΣ
1888.63	341.4	0.39	4*n*	Hl
1888.72	344.4	0.45	2*n*	HΣ
1889.51	357.9	0.55	4*n*	β
1889.65	0.6	0.34	4*n*	Hl
1889.68	358.3	0.60	4*n*	HΣ
1890.38	9.4	0.66	4*n*	β
1890.55	13.2	0.51	4*n*	Hl
1890.59	10.2	0.65	1*n*	HΣ
1891.38	18.5	0.72	3*n*	β
1891.57	24.8	0.54	4*n*	Hl
1891.63	20.3	0.81	3*n*	HΣ
1892.37	28.8	0.89	3*n*	β
1892.55	29.1	0.93	4*n*	Com
1892.65	31.6	0.83	4*n*	Hl
1894.46	37.9	0.95	4*n*	Ho
1894.36	40.8	1.34	15*n*	Barnard
1894.77	41.6	1.16	3*n*	Com
1895.58	39.2	1.03	2*n*	Ho
1895.58	44.3	1.14	3*n*	A
1895.60	44.4	1.16	3*n*	Com
1896.54	46.9	1.41	2*n*	Lewis
1896.65	48.5	1.37	2*n*	Com
1897.57	50.8	1.36	3*n*	A
1899.28	53.1	1.67	3*n*	A
1899.29	55.7	1.54	2*n*	Hu
1899.40	55.7	1.52	6*n*	Doo
1900.57	56.3	1.62	3*n*	Doo
1901.41	59.8	1.47	3*n*	A
1901.49	59.8	1.77	5*n*	Doo
1901.51	61.7	1.52	2*n*	Lewis
1902.44	62.1	1.78	1*n*	Hu
1902.46	63.0	1.86	3*n*	Doo
1902.67	63.3	1.54	1*n*	Lewis
1903.35	65.4	1.78	5*n*	Doo
1903.50	65.2	1.34	5*n*	β
1903.71	67.2	1.37	3*n*	Do
1903.68	63.8	1.70	3*n*	Biesbroeck
1904.48	68.6	1.33	4*n*	Salet
1905.43	71.3	1.21	4*n*	β

The large star has a proper motion of 0″811 in the direction of 204°4 (Auwers), and the close pair is moving with it, so that the three probably form a physical system. There is but little change in the angle and distance of BC from the principal star.

1836.51	241°9	30″17	3*n*	Σ
1864.87	243.6	31.30	8*n*	Δ
1886.62	243.8	31.48	3*n*	Hl
1904.44	244.5	32.56	4*n*	Salet

In 1895 See measured a small star about 10″ from A in the position-angle of 305°8 with the 15½-inch of the Washburn Observatory (*A. J.* 359). This was probably an illusion, as it has not been seen elsewhere with much larger apertures.

[Σ (*Pos. Med.* p. ccxvii)...Ma (**XI, XIII, XV**)...Ma (*F. S.* **I**)...H (**IV**)...Se¹...Lassell (*Mon. Not.* **XVII**, 68)...Da (*Mon. Not.* **XXIV**, 196)...Da⁴...Wn (1738)...Hd...Pk...Waldo (2190)...Flm...Newcomb (*Wash. Obsns.* 1867, 1874)...OΣ (**IX, X**)...Kn...WS...WS²...Gl...Sk...Sk³...Δ (1572, 2193)...Δ (**II**)...En (1518, 1674, 2677)....Do (2287, 2433, 3931)....Hl (*Wash. Obsns.* 1880–86, 1892)...Hl (*A. J.* 232, 274)...Hl (2147)...Hl (**I, II**)...Engelhardt (**II**)...Per...Sp (**I, II, II** App)...Celoria (2949)...Je (2369)...Leuschner (*Pub. A. S. P.* **II**, 46; **IV**, 131)...Ho (2978, 3558)...Ra (**XLVII**)...Beebe (*Am. Jour. Sci.* July, 1879)...T (3186)...β¹...β²...β³...β⁴...β (2947, 3048, 3114, 3142)(*Pub. L. O.* **II**)...Big (*Bul. Ast.* **XII**, 299)...A (*Ast. Soc. Pac.* **VII**, 305)...Hl (*A. J.* 324)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXII**, 383; **LXIII**, 403)...Barnard (*A. J.* 447)...Everett (*Mon. Not.* **LVI**, 464)...See (*A. J.* 349, 359, 378) (*Evolution of the Stellar Systems*)...Com (**X**)...Pt (*A. J.* 397)...A (3466, 3639)(*Bul. L. O.* No. 11)...Brown (3646)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)....Hu (*Bul. L. O.* No. 44)....Biesbroeck....Salet (*Bul. Ast.* **XXII**, 108)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...β⁶...]

(See p. 1079)

8163. **Σ 2215.** There may be some change in the angle, but the measures are conflicting, and the motion, if any, is very slow. The proper motion is 0″027 in 261°6 (*A. G. Berlin*). 41m 50s

1841.56	311°6	0″86	4*n*	OΣ
1855.92	304.6	0.67	3*n*	Se
1868.75	302.8	0.87	5*n*	Δ
1876.22	300.2	0.93	3*n*	Sp
1879.60	298.4	0.77	3*n*	Hl
1884.04	300.3	0.79	6*n*	Per
1901.05	294.0	0.70	2*n*	A
1902.57	296.0	0.69	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...OΣ (**IX, X**)...Newcomb (*Wash. Obsns.* 1874)...Flm...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2198, 3680)...Sp (2133)...Sp (**II**)...Δ (1125)...Δ (**I, II**)...Du...Per...Per (2529, 2685)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...En (2677)....de Ball (2753)....β¹....Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LVI**, 359; **LIX**, 400; **LX**, 508; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)...Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Maw (**III**)...A (*Bul. L. O.* No. 11)...HΣ (**XII**)...β⁶...]

8164. **Σ 2224.** Without change. 42 1

1865.88	350°1	7″58	3*n*	Δ
1902.44	349.9	7.96	3*n*	Hu
1904.69	348.7	7.47	3*n*	Cogshall

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...WS...Gl...Δ (**II**)...Sp (**II**)...]

8166. **H I. 41.** This pair seems to have been wholly neglected for nearly a century. There is no record of its having been observed or seen from 1783 to 1875, when I examined and identified it as here given. There is a small error in the place by H. There appears to be no change. These are all the other observations: 4 17

1783.26	354°3	....	1*n*	H	
1876.22	340.7	1″44	4*n*	Δ	7.5...7.9
1890.46	341.5	1.36	3*n*	β	8.3...8.3
1895.67	338.4	1.42	3*n*	A	
1905.43	340.1	1.29	1*n*	β	

[Δ (**I**, p. 355)...β (3048)(*Pub. L. O.* **II**)...A (*Pub. A. S. P.* **VII**, 305)...β⁶...]

42ᵐ 26ˢ **8167.** **Σ 2225.** The distant pair in the field is referred to by Σ (*Pos. Med.* p. cvi), but not measured. There is some change in angle of the Struve pair.

A and B

1844.36	318°5	9″04	1*n*	Ma
1868.85	314.8	8.81	4*n*	Δ
1879.40	313.5	9.06	2*n*	β
1897.66	309.3	9.01	3*n*	Doo
1902.43	310.9	9.11	3*n*	Hu

C and D

1897.66	336°7	5″24	3*n*	Doo
1902.43	339.5	5.54	2*n*	Hu

A and C

1897.66	246°0	230″65	3*n*	Doo
1902.42	245.8	231.01	2*n*	Hu

[Ma (**XI**)....Ma (*F S.* I)....Δ (**II**)....β3....Doolittle (*Pub. Flower Obsy.* **I**).... Espin (*Mon. Not.* **LXIV**, 677)...]

42 27 **8168.** **Σ 2222.** Unchanged.

1866.53	61°2	2″14	3*n*	Δ
1902.43	59.7	2.05	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Se...Δ (**II**)...Bryant (*Mon. Not.* **LX**, 508)...]

42 28 **8169.** **H 2810.** The nebula *h* 4333 (Dreyer 6445) which is in the field *p*, was noted with the 18½-inch as double (1876). These are all the measures of H 2810.

1890.43	189°8	40″86	2*n*	Gla	7.3...9.8
1904.67	188.2	40.67	3*n*	Miller	8.0...9.7

[Glasenapp (I)...]

42 30 **8170.** **Σ 2226.** Later measures make the distance larger.

1869.77	91°5	10″99	4*n*	Δ
1879.37	89.6	11.47	3*n*	Cin
1902.47	90.9	11.84	3*n*	Hu
1903.48	90.7	11.52	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Cin5...β6...]

42 38 **8171.** **Σ 2221** *rej.* These are the only measures:

1902.44	75°8	18″83	3*n*	Hu	
1904.44	75.5	18.49	2*n*	β⁶	8.4...10.6

42 41 **8172.** **β 824.** Discovered with the 15½-inch at the Washburn Observatory. The later measures are:

1888.54	349°4	0″69	4*n*	Com
1898.67	351.3	0.63	1*n*	Brown
1902.95	349.0	0.67	6*n*	Doo

[β (**XII**)...β4...Com (**VI**)...Brown (3646)...Doolittle (*Pub. Flower Obsy.* **II**)...]

42 50 **8173.** **H 4986.** "One or two more companions." There seems to be an error of 100° in the estimated angle of H.

1901.42	226°5	10″62	3*n*	β⁵	8.2...11.2

There is a 13 m star, 5°4 : 22″9. and a 12.5 m at 61°4 : 27″2.

8174. **H 1304.** Nothing but this since Herschel: 42ᵐ 53ˢ

1904.76	267°0	10″41	3*n*	Miller	9.8...10.5

8175. **Σ 2229.** Fixed. 42 55

1868.65	341°5	6″16	4*n*	Δ
1902.47	340.7	6.45	2*n*	Hu
1905.66	341.4	6.38	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...β6...]

8176. **Σ 2223** *rej.* Measures from *A. G. Leipzig*, p. 249. 43 3

1902.44	211°2	18″54	3*n*	Hu
1904.73	209.0	18.34	3*n*	Cogshall

8177. **β 358.** Discovered with the 6-inch. 43 10

1892.39	206°1	4″22	1*n*	β
1902.91	204.1	4.49	4*n*	Doo

[β (**VI**)....β (2062, 3142) (*Pub. L. O.* **II**)....Cin5....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

8178. **O. Stone 37.** From Cin⁴. 43 29

1890.42	190°5	9″57	2*n*	Gla	7.1...8.4
1903.60	188.1	10.79	1*n*	Scott	

[Cin4...Glasenapp (I)...Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...]

8179. **Σ 2228.** Fixed. 43 31

1867.26	106°4	18″71	3*n*	Δ
1902.47	105.8	18.96	2*n*	Hu

[Ma (*F. S.* **II**)...Δ (**II**)...Cin5...Glasenapp (I)...Bryant (*Mon. Not.* **LX**, 508)...]

8180. **β 632.** (AC = OΣ 336 *rej.*) The faint companion to the principal star of this wide pair was detected with the 18½-inch. The three stars seem to be relatively fixed. The magnitude in DM is 6.5. 43 32

A and B

1887.53	344°2	5″36	2*n*	Ho
1898.56	341.2	5.60	4*n*	Hu
1899.39	343.9	5.46	2*n*	β

A and C (= OΣ 336 *rej.*)

1866.86	164°9	43″16	3*n*	Δ
1877.97	164.9	42.80	1*n*	β
1899.39	164.2	42.44	3*n*	β

Hussey notes a 14 m star, 349°1 : 32″16 (1898.57) 1*n*.

[β (**X**)...β1...Ho (2978, 3234)...Δ (I)...Ma (**XI**)...Brown (3645)...Hu (*Pub. L. O.* **V**)...]

8181. **H 2811.** Nothing later but the following: 43 40

1904.67	115°3	13″95	3*n*	Miller	9.8...10.8

44^m 5^s **8182.** *ψ Draconis.* **Σ 2241.** (= **H** IV. 7 = **Sh 254.**) No relative motion, but the components have the same proper motion of 0″274 in 178°9 (Auwers).

1866.28	15°2	30″89	4*n*	Δ
1887.86	14.8	30.75	2*n*	Eng
1904.40	15.3	30.40	2*n*	β

OΣ measures a distant 10.5 m star, the change corresponding to the motion in space of A.

1857.67	128°3	101″52	1*n*	OΣ
1884.68	125.2	96.20	1*n*	HΣ
1887.82	123.9	96.26	2*n*	Eng
1904.40	122.3	93.23	2*n*	β

[Ma (324) . . . Ma (*F. S.* **I, II**) . . . Ma (**XI**) . . . H 1. . . Ra (**XXI**). . . Δ (1125, 1194). . . Δ (**I, II**). . . . OΣ (**IX, X**, pp. 100, 180). . . . Pk. . . . Engelhardt (**II**). . . . Je (2369). . . . Glasenapp (**III**). . . *Annals Toulouse Obsy.* **III**. . . β6. . .]

44 8 **8183.** **Σ 2227.** In Cin5 this is identified with a star in Lamont, 35s *p* and 2′ *n* of this place. The change in angle and distance is due to proper motion.

1830.22	296°6	19″68	3*n*	Σ
1867.50	295.2	19.06	3*n*	Δ
1879.49	294.0	18.90	2*n*	Cin
1890.56	292.6	18.15	2*n*	Gla
1892.70	295.9	17.96	3*n*	T
1905.55	293.9	18.04	2*n*	β

[Ma (*F. S.* **I**). . . . Ma (**XI**). . . . Δ (**II**). . . . Cin5. . . . T (3185). . . . Glasenapp (**I, IV**). . . . *Annals Toulouse Obsy.* **III**. . . β6. . .]

44 20 **8184.** **H 855.** No motion.

1880.54	82°2	18″39	3*n*	Big	9.5. . . 10
1905.55	82.5	18.17	1*n*	β6	9.6. . . 9.9

44 38 **8185.** **β 1122.** (AB = **Howe 40.**) The duplicity of Howe's companion was discovered with the 12-inch. There seems to be no change in its position with reference to the principal star. The fourth star, D, was added by Aitken with the 12-inch.

B and C

1897.61	170°6	1″47	3*n*	A
1902.17	173.3	1.07	3*n*	Doo

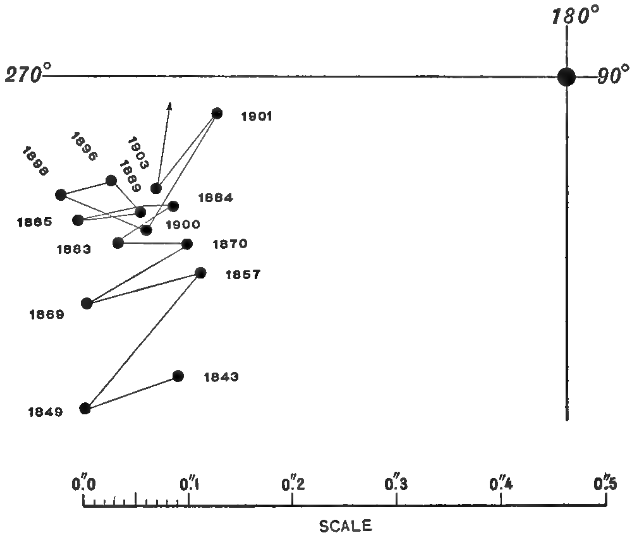
A and BC

1880.44	8°7	6″54	2*n*	Cin
1889.39	9.6	6.46	3*n*	β
1897.60	10.4	6.41	2*n*	A
1902.17	10.6	6.65	3*n*	Doo

[β (**XVI**). . . β (2956) (*Pub. L. O.* **II**). . . Cin4. . . Cin6. . . A (3466). . . Doolittle (*Pub. Flower Obsy.* **II**). . .]

44 46 **8186.** **OΣ 337.** The motion is very slow, and the measures too discordant to indicate anything but a little change in the position-angle. Some of the observers place the smaller star in the opposite quadrant.

1843.37	307°6	0″47	2*n*	Ma
1849.67	304.6	0.56	4*n*	OΣ
1857.07	298.1	0.4±	2*n*	Se
1869.45	295.2	0.51	6*n*	Δ
1870.44	293°8	0″40	4*n*	Du
1883.52	290.3	0.46	3*n*	Per
1884.62	288.2	0.40	3*n*	Hl
1885.41	286.3	0.49	3*n*	Per
1889.12	287.7	0.43	3*n*	Sp
1896.60	282.8	0.45	2*n*	Lewis
1898.51	283.2	0.50	3*n*	Hu
1900.57	290.1	0.43	3*n*	Doo
1901.59	275.9	0.34	9*n*	Bryant
1903.58	285.2	0.41	2*n*	Biesbroeck
1905.67	274.3	0.34	2*n*	A



OΣ 337

The last measure was received too late for a place on the diagram.

[Ma (**XI**). . . OΣ (**IX**). . . Se. . . Du. . . Flm . . . Do (2307, 3680) . . . Δ (I). . . Per . . . Per (2529, 2749). . . Hl (*Wash. Obsns.* 1884). . . Hl (**II**). . . En (2786). . . Big (*Bul. Ast.* **XII**, 299). . . Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403). . . . Sp (**III**). . . . Hu (*Pub. L. O.* **V**). . . . Doolittle (*Pub. Flower Obsy.* **I**). . . HΣ (**XII**). . . Biesbroeck. . .]

8187. **Σ 2230.** Change from a small proper motion in A. B is DM (7°) 3483. 44^m 54^s

A and B

1831.64	82°6	44″39	3*n*	Σ
1867.50	83.5	45.05	3*n*	Δ
1879.43	83.4	45.80	3*n*	Cin
1900.48	83.7	45.47	2*n*	β

A and C

1831.64	107°0	36″45	3*n*	Σ
1867.50	108.2	36.92	3*n*	Δ
1879.41	107.9	38.13	2*n*	Cin
1900.48	108.9	37.62	2*n*	β

B and C

1831.64	209°2	18″78	3*n*	Σ
1867.50	209.4	18.80	2*n*	Δ
1879.50	209.1	19.00	2*n*	Cin
1900.48	209.7	19.15	2*n*	β

[Ma (*F. S.* **I**). . . Ma (**XI**). . . Δ (**II**). . . Cin5. . . Glasenapp (**I, V**). . *Annals Toulouse Obsy.* **III**. . . β5. . .]

45^m 8^s **8190.** **A. G. 214.** Double in *A. G. Leiden.* Measures by β^6.

45 20 **8191.** **β 1123.** Discovered with the 12-inch. In the large cluster, *Messier* 7.

1897.64	220°4	0″27	2*n*	See
1898.49	207.6	0.45	2*n*	A
1904.63	205.2	0.37	1*n*	A

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...See (3496)...A (3585)...]

45 22 **8192.** **Σ 2232.** (= **S 695.**) Fixed.

1867.76	141°6	6″58	4*n*	Δ
1904.47	140.0	6.71	3*n*	Hu
1905.67	141.0	6.20	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Se...WS^2...Δ (**II**)...Glasenapp (**III**)...β^6...]

45 27 **8193.** **Σ 2231** *rej.* All the observations are of recent date.

1904.73	153°4	32″16	3*n*	Cogshall	
1905.36	152.7	32.22	1*n*	β^6	8.5...11.5

45 41 **8195.** **H 4990.** "Coarse double star; chief of a cluster." Examined (1904) and identified as SD (22°) 4447.

1890.55	299°8	23″53	2*n*	Gla	8.7...10.3

[Glasenapp (**I**)...]

45 52 **8196.** **H 4991.** The only measures are:

1890.47	178°9	23″50	2*n*	Gla	9.3...9.4

[Glasenapp (**I**)...]

45 52 **8197.** **Σ 2233.** Fixed.

1867.62	67°8	2″12	4*n*	Δ
1904.47	67.1	2.26	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...T (3185)...]

45 55 **8198.** **S 694.** *Ophiuchi* 295. (= **OΣ (App) 159.**) W^2 XVII. 892 and 886. Unchanged.

1874.97	237°4	81″83	3*n*	Δ	6.0...7.2
1904.41	237.5	81.42	2*n*	β	

[Δ (**I**)...Schur (2255)...β^6...]

45 58 **8199.** **Σ 2238.** Not measurable in 1866 by Δ; very difficult with the 6-inch in 1876. No motion.

1900.47	286°7	2″39	1*n*	β	9.5...9.6
1902.47	287.0	2.55	3*n*	Hu	

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1736)...β^6...]

46 : **8200.** **Howe 41.** From Cin^5. Approximate place.

8201. **Lewis 16.** The place given by Lewis is the same as that for OΣ 338. 46^m :^{s}

[Lewis (*Mon. Not.* **LXI**, 486)...]

8202. **H 4993.** The only measures are: 46 6

1890.47	303°7	18″70	2*n*	Gla	9.4...10.1

[Glasenapp (**I**)...]

8203. **Σ 2236.** Fixed. 46 8

1865.95	93°8	3″12	3*n*	Δ
1902.47	94.8	3.47	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...]

8204. **Σ 2234.** No material change. 46 13

1868.49	200°6	16″38	4*n*	Δ
1902.47	199.1	16.63	2*n*	Hu

[Ma (*F. S.* **II**)...Mh...Hd...Δ (**II**)...Gl...WS^2...Hl (*Wash. Obsns.* 1863)... Hl (**I**, p. 133)...Cin^5...Glasenapp (**I**)...]

8205. Double in *Washington Zones.* Measures from Cin^6. 46 12

8206. **Σ 2237.** Unchanged. 46 14

1867.60	8°1	20″40	4*n*	Δ
1905.66	7.7	20.52	1*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...β^1...β^6...] (See p. 1079)

8208. **Ho 422.** Later measures are: 46 17

1899.66	21°6	0″47	1*n*	A
1904.50	27.0	0.48	4*n*	Doo

[Ho (3234, 3558)...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8209. **Σ 3128.** Probably unchanged. The principal star has a proper motion of 0″234 in 206°4 (Innes). 46 28

1867.73	27°4	1″53	4*n*	Δ
1878.32	35.0	1.25	1*n*	β
1879.55	32.0	1.51	1*n*	Cin
1886.30	26.0	1.19	1*n*	LM

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^1...Cin^5...LM...] (See p. 1079)

8210. **OΣ 338.** Probably binary in slow motion. The components have a small common proper motion. 46 34

1843.37	43°0	0″58	4*n*	Ma
1845.21	44.3	0.68	4*n*	OΣ
1852.30	39.0	0.65	3*n*	OΣ
1855.63	36.1	0.70	3*n*	OΣ
1868.94	25.7	0.60	6*n*	Δ
1872.56	27.8	0.82	3*n*	OΣ
1878.64	22.9	0.75	1*n*	β

1882.12	21°4	0″74	6*n*	Hl
1887.53	18.9	0.63	4*n*	Sp
1893.51	14.5	0.67	1*n*	Ho
1896.61	16.2	0.58	2*n*	Com
1898.51	16.4	0.77	3*n*	Hu
1905.55	11.5	0.77	3*n*	Doo

Comstock measures a 13 m star, 216°7 : 27″97 (1894.74) 1*n*. Lewis (*Mon. Not.* LIX, 417) measures another pair, the place of which is the same as that given for OΣ 338, 352°6 : 0″84 (1896.48); magnitudes not given.

[Ma (**XI**)...OΣ (**IX**)... Se... Se^2 ... Flm ... Do (2307, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Newcomb (*Wash. Obsns.* 1874)...Hl (**II**)...Δ (**I**)...Per... Per (2529, 2685) ... Je (2449) ... Sp (**II, II** App.) ... En (2678) ... Lv^1 ... β^1 ... Maw (**I, III**)...Ho (3234)...Big (*Bul. Ast.* **XII**, 299)...Callandreau (*Bul. Ast.* **XII**, 523)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Com (**X**)...Solá (3529, 3679)...Brown (3646)... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Biesbroeck...]

46^m 44^s **8211.** **Σ 2235.** No material change.

1866.74	124°6	18″82	3*n*	Δ
1902.47	123.8	19.26	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Δ (**II**)...Cin^5...Glasenapp (**I**)...]

46 49 **8212.** **Ho 561.** A later measure is:

1902.37	328°6	32″93	3*n*	Doo

[Ho (3557)...]

47 2 **8215.** **Σ 2239.** No change.

1868.00	317°6	2″28	4*n*	Δ
1902.47	319.0	2.47	3*n*	Hu

[Ma (*F. S.* **I**) ...Ma (**XI, XII, XIII**)...Δ (**II**)...Cin^5...Glasenapp (**IV**)...]

47 25 **8216.** **H 4995.** "A third closer suspected." The 18½-inch failed to show any third star (1878), as did the 40-inch in 1900.

1900.96	155°3	28″54	2*n*	β	6.7...11.7

[β^1...β^5...]

47 39 **8218.** **β 964.** Discovered with the 18½-inch.

1893.67	328°9	1″02	2*n*	Wilson

[β (**XIII**)...β^3...Wilson ( )...]

(See p. 1079)

47 39 **8219.** **Σ 2240.** Fixed.

1867.28	199°6	3″00	3*n*	Δ
1902.46	201.7	2.96	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Δ (**II**)...WS...WS^2...T (3185)...]

47 40 **8220.** **Σ 2242.** Fixed.

1866.94	326°4	3″44	3*n*	Δ
1902.46	326.8	3.51	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Se...Ra (**XXV**)...Du...Δ (1209)...Δ (**I, II**) ...WS^2... Hl (**II**) ... Glasenapp (**IV**)... Knorre (3632) ... *Annals Toulouse Obsy.* **III**...]

8221. **A 234.** A later position is: 47^m 42^s

1902.94	29°6	0″50	3*n*	Lewis

[A (3784) (*Bul. L. O.* No. 16)...Lewis (*Mon. Not.* **LXIII**, 403; **LXIV**, 802)...]

8223. **H 1307.** The following are all the measures: 47 45

1875.03	323°6	32″03	3*n*	Δ	7.0...11.0
1904.97	323.1	33.31	2*n*	β	

[Δ (**I**)...β^6...]

8224. **OΣ (App) 160.** This place agrees with that of W^1 XVII. 925, but Dembowski could not find any wide pair here, and later (1876) I could find nothing anywhere very near likely to be the pair in question. It is probable that in both cases brighter stars were looked for, as the magnitudes in OΣ are 7 and 8. The two stars, DM (10°) 3315 and 3314, form a wide pair of the class described, and are in the given place. 47 46

1900.46	190°9	102″17	2*n*	β	8.2...8.6

The A. G. positions give, 191°6 : 100″87.

[Δ (**I**, p. 234)...β^5...]

8226. **Innes 109.** Discovered at the Cape of Good Hope. 48 9

[Innes (3406) (*Mon. Not.* **LVII**, 533; **LXI**, 604)...]

8227. **Hn 139.** Fixed. 48 13

1890.55	155°1	3″56	1*n*	Ho
1900.55	152.1	3.53	2*n*	β
1905.36	151.4	3.60	3*n*	Doo

[Hn (*Washburn Obsns.* **II**)...Com (**VI**)...Ho (3234)...β^5...]

8228. **A. Clark 8.** Discovered by Alvan Clark in 1856 with a 7¾-inch. No evidence of change. In some of the measures the angle is reversed. 48 15

1868.50	242°9	0″38	1*n*	OΣ	
1872.94	235.7	0.3±	3*n*	Δ	8.2...8.2
1876.61	237.8	0.32	1*n*	OΣ	
1884.60	240.9	0.37	2*n*	Hl	
1903.48	237.7	0.31	2*n*	Gr. Obsy.	

[Da^4 ... Da (*Mon. Not.* **XVII**, 257) ... Δ (**I**) ... WS^2... Sk ... Sk^5... Hl (*Wash. Obsns.* 1884) ... Hl (**II**) ... OΣ (**X**) ... Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIV**, 802)...]

8229. **Ho 562.** Fixed. 48 16

1902.36	259°1	3″68	4*n*	Doo

[Ho (3557)...]

8230. **A 235.** The only other measure is: 48 25

1902.67	61°0	0″26	2*n*	Lewis

[A (3784) (*Bul. L. O.* No. 16)...Lewis (*Mon. Not.* **LXIII**, 412)...]

(See p. 1079)

$48^m\ 48^s$ **8232.** **Ho 71.** No change.

1904.50	225°.5	3″.43	3*n*	Doo

[Ho (2778, 3558)...]

49 1 **8233.** **H 4997.** The only later position is:

1890.51	262°.9	11″.29	2*n*	Gla	9.9...10.0

[Glasenapp (I)...]

49 4 **8234.** **Σ 2243.** Fixed.

1865.66	46°.7	1″.50	3*n*	Δ
1886.05	44.7	1.61	6*n*	Per
1902.47	44.2	1.51	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**X**) ... Se ... OΣ (**IX, X**) ... Δ (**II**)... Per... Per (2748) ... Glasenapp (**IV**)...]

49 24 **8235.** 90 *Herculis.* **β 130.** Discovered with the 6-inch; a beautiful pair, even with a small aperture. The components have a striking difference in color—*golden* and *blue.* The bright star has a proper motion of 0″.064 in the direction of 5°.1 (Auwers). If the small star was fixed in space, the movement of A during the interval covered by the measures to 1898 would increase the position-angle of the companion 27°.4 and its distance 1″. The measures show no sensible change, and there is little doubt of its being a physical system.

Some of the later measures are:

1879.47	118°.6	1″.76	1*n*	β
1879.56	121.6	1.74	2*n*	OΣ
1881.46	122.2	1.90	4*n*	β
1888.42	123.3	1.67	3*n*	T
1889.67	121.5	1.63	4*n*	Maw
1898.47	121.8	1.70	2*n*	Doo
1905.34	123.7	1.75	5*n*	Doo

[β (**II**)...β (*Mon. Not.* **XXXIII**, 437)...β 3...β 4...OΣ (**X**)... Δ (**I**).. Δ (2086)... En (2786)...T (2991)...Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)...Maw (**I, IV**)...Biesbroeck...]

49 25 **8236.** **H 2814.** H (VIII) 157°.1 : 25″± : 7...9 (1836.4); no mention of the small star. C was readily seen with the 6-inch in 1875. Heis gives A as a naked-eye star, 6 m. No change in AB.

AB	1878.45	157°.0	20″.94	2*n*	Cin	6.5... 9.0
	1890.46	157.8	20.30	2*n*	Gla	6.2... 9.0
	1904.46	157.4	20.54	1*n*	β	6.4...10.0
AC	1904.46	349.0	33.74	1*n*	β	...12.0

[H (**VIII**)...Cin 4...Cin 5...Glasenapp (**I**)...β 6...]

49 31 **8237.** **A. Clark 9.** Discovered by Alvan Clark in 1856 at the observatory of Dawes. No material change.

1875.61	237°.6	0″.91	3*n*	Sp
1882.08	232.1	1.04	6*n*	Hl
1901.30	235.2	1.06	6*n*	Gr. Obsy.
1901.78	231.0	0.96	2*n*	A

[Da 4...Da (*Mon. Not.* **XVII**, 257)... Se... Du... Sp (2133)... Sp (**II**)... Flm ... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**).... Δ (**I**)....OΣ (**X**)....Ho (2978)....Big (*Bul. Ast.* **XII**, 299).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)...Brown (3646)...A (*Bul. L. O.* No. 11)...]

8238. **A 236.** No other measures. $49^m\ 40^s$

[A (3784)(*Bul. L. O.* No. 16)...]

8239. **A. G. 215.** Double in *A. G. Leiden.* Measures by β 6. 50 38

8240. **H 5002.** The only later observation is: 50 53

1879.48	37°.0	8″.39	1*n*	Cin 6	10.0...10.5

8241. **Σ 2244.** No material change. 50 55

1868.29	274°.4	1″.12	4*n*	Δ
1875.63	276.3	1.00	4*n*	Sp
1902.47	276.6	0.90	4*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X, XI**) ... Se ... Hd... Δ (1125) ... Δ (**I, II**)... Hl (*Wash. Obsns.* 1863)...Hl (**I**, p. 133)...WS 2...O. Stone (2201)...Cin 5...Cin 6...Lv 1 ...Per ... Per (2529, 2748) ...Sp (**II**)...T (2898)...OΣ (**IX**)...Pt...Pt (*A. J.* 397)...Glasenapp (**IV**)... Brown (3646)...*Annals Toulouse Obsy.* **III**...]

8242. **OΣ 339.** Unchanged. 51 3

1868.95	181°.4	2″.84	5*n*	Δ
1898.45	178.9	3.19	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)... Per...Per (2560, 2749)... Ho (2978)... Hu (*Pub. L. O.* **V**)...]

8243. **Σ 2245.** No change since Struve. 51 8

1866.51	115°.1	2″.65	3*n*	Δ
1890.36	114.1	2.65	7*n*	Giacomelli
1902.46	114.7	2.68	2*n*	Hu

[Ma (*F. S* **I**)...Ma (**X, XI**)... H 1... Mh...Wr... Se...Ra (**XXI**)...Δ (**I, II**)... Hl (*Wash. Obsns.* 1863)....Hl (**I**, p. 133)....WS....Gl....Du....Giacomelli (**III**)...Δ (1125, 1195)... *Annals Toulouse Obsy.* **III**... Coleman (*Mem. R. A. S.* **LIV**).... Sp (**II**).... T (2898).... Glasenapp (**I, III**).... Knorre (3518) .... Ho (3558)...]

8244. **H 5003.** "Both stars high yellow." Probably unchanged. 51 23

1836.68	107°.1	6″.20	2*n*	H	5.6...7.5
1877.52	105.6	5.57	3*n*	Cin	6.0...8.0
1890.43	105.5	5.17	2*n*	Gla	6.3...7.6
1903.60	104.1	5.37	2*n*	Scott	
1903.56	104.7	5.43	5*n*	Jouffray	

[H 3...J 3...Cin 4...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 368)(*Mon. Not.* **LXIV**, 52)...See (3496)...Do (3798)...Jouffray (*Bul. Ast* **XXI**, 299)...]

8245. **Ho 72.** The following are all the measures: 51 27

A and B

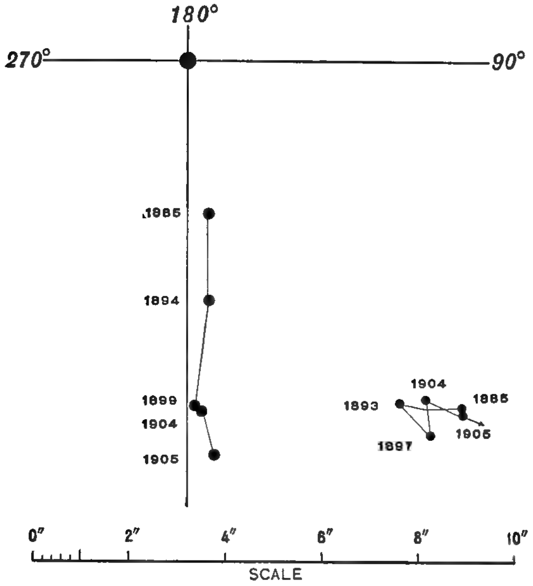
1885.10	7°.8	3″.22	2*n*	Ho
1894.51	5.2	5.03	3*n*	Ho
1899.72	1.3	7.23	1*n*	Lewis
1904.18	2.4	7.37	4*n*	Doo
1905.62	4.0	8.26	8*n*	β

A and C

1885.52	38°.4	9″.25	1*n*	Ho
1893.48	32.0	8.41	1*n*	Ho
1897.72	33.2	9.35	1*n*	Lewis
1904.48	35.2	8.67	2*n*	Doo
1905.62	37.9	9.38	3*n*	β

B and C

1905.61	96°.5	5″.09	2*n*	β



Ho. 72

The measures appear to show a rapid change in the distance of AB, and as there is no certain change in AC, the small star B would seem to have a large proper motion. The measures of AC are inconsistent with any theory of change, or otherwise.

[Ho (2778, 3558)...Lewis (*Mon. Not.* **LX**, 509)...β^{6}...]

(See p. 1079)

51m 28s **8246.** **Σ 2246.** Fixed.

1865.89	101°.4	5″.44	3*n*	Δ
1902.47	101.7	5.79	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...WS^{2}...Glasenapp (**IV**)...]

51 32 **8247.** **Σ 2251.** No material change.

1867.81	30°.4	14″.70	3*n*	Δ
1902.51	27.7	15.18	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...]

51 40 **8248.** **Kr 47.** Noted double in *A. G. Hels.*

1898.41	205°.0	7″.87	3*n*	Doo

[β (3042) (*Pub. L. O* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...Espin (*Mon. Not.* **LXIV**, 680)...]

8249. **β 1299.** The close pair was suspected with the 6-inch in 1872, and looked up and verified with the 40-inch in 1900. No other measures. 51m 50s

[β^{5}...]

8251. **Δ 17.** Discovered by Dembowski. No change. 52 3

1904.97	130°.6	23″.77	2*n*	β

[Δ (**I**, p. 374; **II**, p. 617)...Δ (1736)...Glasenapp (**IV**) called Σ 2247...β^{6}...]

8252. **β 417.** Discovered with the 6-inch. In the field with Σ 2246. No change. 52 13

1889.66	270°.9	1″.43	3*n*	Maw
1898.65	273.1	1.54	2*n*	Brown
1902.96	270.8	1.57	6*n*	Doo

[β (**VII**)....β (2103)....Maw (**I**)....Brown (3646)....Doolittle (*Pub. Flower Obsy.* **II**)...]

8253. **Σ 2250.** (= S 696.) Fixed. 52 50

1866.25	345°.4	7″.82	3*n*	Δ
1902.47	345.1	7.95	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...H (**IV**)...Mh...Se...Δ (**II**)...WS^{2}...Cin^{5}...Glasenapp (**I**) ..*Annals Toulouse Obsy.* **III**...]

8254. **Ho 423.** Unchanged. 52 52

1903.42	291°.3	4″.66	3*n*	Doo

[Ho (3234, 3558)...]

8255. **Σ 2253.** H called the small star red. Sp measures a third star, 10.5 m, 64°.7 : 76″.06 (1877.64) 1*n*. Distance of the Struve companion is decreasing. 52 55

1829.53	80°.4	18″.06	2*n*	Σ
1844.60	80.8	16.50	4*n*	Ma
1865.09	80.3	16.52	6*n*	Δ
1880.56	79.8	16.10	2*n*	Pt
1881.37	79.5	16.15	3*n*	β
1881.62	80.9	16.41	3*n*	Sp
1901.21	78.3	15.36	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**IV**)...Hd...Flm...Δ (1474)...Δ (**II**)...Pt...Sp (**II**)...β^{4}...*A. G. Leipzig.* p. 210...β^{5}...]

8256. **Bird 3.** The wide pair, AB, noted "duplex, Cl. III" in O. Arg. N. The faint star between was discovered by F. Bird in 1869. The only other measures are: 52 55

AB	1901.40	325°.8	11″.74	2*n*	β
AC	1901.40	328.5	22.34	2*n*	β
BC	1901.40	332.7	10.31	2*n*	β

[Bird (*Ast. Reg.* **VII**, 218)...β^{3}...β^{5}...]

52^{m} 57^{s} **8257.** **Σ 2247.** Unchanged. Since Part I was printed I have identified and measured this pair. The R. A. given there, and in *Mens. Micr.*, Lindsay, and other catalogues is nearly 2^{m} too small. It should be 17^{h} 54^{m} 46^{s}. The principal star is DM (29°) 3160. In Part I it was taken to be DM (29°) 3153.

1867.52	190°4	11″37	4*n*	Δ
1879.85	190.0	11.51	2*n*	β
1904.97	190.0	11.41	2*n*	β

[**Ma** (*F. S.* **II**)...Ma (**XI**)...Δ (1736)...Δ (**II**)...β^{3}...Glasenapp (**IV, V**)...β^{6}...]

52 58 **8259.** **Ho 73.** (AC = **Σ 2256** *rej.*) No early measures of AC.

A and B

1903.41	33°9	1″39	3*n*	Doo
1905.33	34.2	1.87	1*n*	β

A and C

1903.41	303°4	8″39	3*n*	Doo
1905.33	310.1	8.38	1*n*	β

[Ho (2778, 3558)...Espin (3717)...β^{6}...]

52 58 **8260.** **Σ 2252.** No sensible change. Glasenapp measures a distant 8.3m star, 163°8 : 94″24 (1890.54) 2*n*.

1867.15	25°6	3″81	3*n*	Δ
1902.47	23.5	4.13	2*n*	Hu

[**Ma** (*F. S.* **I**)...Ma (**XI, XII, XIII**)... Se...WS...WS^{2}...Gl...Δ (**II**)...Glasenapp (**I, III**)...*Annals Toulouse Obsy.* **III**...]

53 1 **8261.** **Ho 424.** The only later position is:

1903.41	207°6	1″08	3*n*	Doo

[Ho (3234)...]

53 3 **8262.** **H 1308.** Nothing since but the following:

1880.52	140°6	9″84	2*n*	Big	10.5...10.8
1905.76	140.1	9.67	1*n*	β^{6}	9.5... 9.6

This star is DM (9°) 3525. The angle does not agree with H, but no other pair found.

53 4 **8263.** **Σ 2255.** Unchanged.

1868.16	343°3	8″64	4*n*	Δ
1904.43	343.6	8.83	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^{5}...β^{6}...]

53 8 **8264.** **Σ 2257** *rej.* No early measures.

1905.33	150°2	21″86	1*n*	β	7.5...10.8

[Espin (3717)...β^{6}...]

53 18 **8266.** **Hu 753.** No other measures.

[Hu (*Bul. L. O.* No. 65)...]

8267. **Ho 425.** Later measures are. 53^{m} 24^{s}

1903.24	141°0	5″10	3*n*	Doo
1904.41	145.4	5.53	2*n*	β

[Ho (3234)...β^{6}...]

8268. **Σ 2254.** Unchanged. Dawes speaks of a third faint star, 50° : 30″. 53 27

1867.10	266°9	3″17	3*n*	Δ
1902.50	265.2	3.26	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... Bp... Se... Da^{3}... Ba (**II**)... Δ (**II**)...WS...Gl... Glasenapp (**III**)...Coleman (*Mem. R. A. S.* **LIV**)...]

8270. **Σ 2258.** Without change. 53 35

1867.26	221°6	2″60	3*n*	Δ
1902.50	221.8	2.37	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Du...WS...Gl...WS^{2}...Δ (**II**)...Glasenapp (**IV**)...Lewis (*Mon. Not.* **LX**, 509)...]

8271. **Hu 235.** A later measure is: 53 41

1903.75	265°4	1″69	3*n*	Biesbroeck

[Hu (*A. J.* 494)...Biesbroeck...]

8274. γ *Draconis.* **β 633.** The minute companion to γ *Draconis* was discovered with the 18½-inch. This star has a proper motion of 0″027 in the direction of 257°4 (Auwers). This is very nearly in the direction of B, and, in the twenty years covered by the measures, should diminish the distance of that star 0″5 if it is not moving with the large star. The measures do not show any change in the distance, and the two are probably moving together. All the later measures of the several companions are given. 53 49

A and B

1879.80	151°6	20″94	2*n*	β
1889.25	151.3	21.10	3*n*	β
1898.30	151.3	20.92	2*n*	β

A and C

1898.34	230°2	45″73	1*n*	β

A and D

1898.34	10°4	57″33	1*n*	β

A and F

1898.27	116°5	125″52	1*n*	β

[β (**X**)...β^{1}...β^{3}...β (*Ast. and A.-P.* **XIII**, 1)...β (2930)(*Pub. L. O.* **II**)...]

8275. **Hn 140.** No change. 53 56

1900.37	265°2	2″24	3*n*	Doo

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

8276. **Ho 74.** No sensible change. 54 0

1904.51	126°3	3″09	3*n*	Doo

[Ho (2778, 3558)...]

$54^{m}\ 3^{s}$ **8277.** **O. Stone 38.** Place erroneous in Cin^4.

54 27 **8279.** **Σ 2259.** (= **H IV. 42 = Sh 256.**) Fixed.

1866.80	277°9	19″47	4*n*	Δ
1902.51	277.7	19.92	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIII**)... Δ (1209)... Δ (**I, II**)... Glasenapp (**III**) ...*Annals Toulouse Obsy.* **III**...]

54 29 **8280.** **OΣ (App) 161.** The only other measures are:

1901.43	76°9	62″28	3*n*	β

Δ (I)...β^5...]

54 30 **8281.** **Cordoba.** Double in *Cordoba Zones.* Measures by β^6. (See No. 8300.)

54 34 **8282.** **H III. 107.** "North of Cluster, M 20."

54 38 **8284.** 67 (o) *Ophiuchi.* **β 1124.** (CD = **β 634**; AC = **H VI. 2 = σ 557 = Sh 255 = OΣ (App) 162.**) The companion to A was discovered with the 36-inch, and the companion to C with the 18½-inch. The wide stars, AC, appear to be relatively fixed. The principal star has a small proper motion, 0″027 in the direction of 257°5 (Auwers). The measures of B do not cover a sufficient time to show whether or not that star is moving with the primary.

A and B

1898.54	195°8	6″72	1*n*	β
1900.40	197.0	6.40	1*n*	A

C and D (= β 634)

1889.40	129°6	8″40	2*n*	β
1898.54	128.7	8.16	1*n*	β

A and C (= Sh 255)

1849.94	142°7	54″47	3*n*	OΣ	4.2...8.0
1875.59	142.8	54.83	4*n*	Δ	4.2...7.6
1878.57	143.0	54.70	1*n*	β	5.6...9.0
1886.34	142.9	54.29	7*n*	En	4.4...8.1
1889.40	143.6	54.54	2*n*	β	

A and E

1898.54	178°0	45″66	1*n*	β

[β (**X, XVI**)....β^1....β (2956) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**)....A (*Bul. L. O.* No. 11)...]

The principal measures of AC are given. The following relate to the old components:

[Δ (I)...En (2786)... *Annalen Königsberg Sternwarte* **XVII**... Powell (*Mem. R. A. S.* **XXV**)...Ra (**XXI, XXXVIII**)...OΣ (**X**, p. 36)...]

54 38 **8285.** **β 283.** The nearest companion was discovered with the 18½-inch, and the other added with the 36-inch. This is a naked-eye star in *Sagittarius,* about 15′ *n* of the trifid nebula.

A and B

1892.39	238°6	8″17	2*n*	β
1895.54	237.7	8.45	3*n*	A

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....β^1....β^3....β (3142) (*Pub. L. O.* **II**).... A (*A. S. P.* **VII**, 305)....]

8286. **Ho 75.** Change in angle? $54^{m}\ 45^{s}$

1894.18	215°4	1″29	3*n*	Ho
1903.31	217.1	1.30	3*n*	Doo

[Ho (2778, 3558)...]

8288. **β 47.** Discovered with the 6-inch. It is a difficult pair with that aperture. 54 52

1891.61	273°8	1″37	3*n*	β
1893.82	273.0	1.46	5*n*	Sp
1895.63	277.1	1.46	3*n*	A
1896.55	273.2	1.64	3*n*	Lv
1902.93	276.0	1.56	6*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114) (*Pub. L. O.* **II**)...Δ (I)...Sp (**III**) ...A (*A. S. P.* **VII**, 305)...Lv (*A. J.* 407)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8289. **O. Stone 39.** From Cin^4. 55

1905.35	159°8	3″25	3*n*	Doo	9.2...9.8

8290. **H 1309.** Nothing since H but the following: 55 1

1880.50	2°5	6″91	1*n*	Big	9.5..10.0
1905.76	4.0	6.14	2*n*	β^6	9.7..10.0

8291. **H 1310.** The 40-inch shows a new and nearer companion to B. 55 4

AB	1880.50	32°1	12″24	1*n*	Big	10.0...10.2
	1905.76	34.8	11.83	2*n*	β^6	9.9... 9.9
BC	1905.76	0.4	3.65	2*n*	β^6	...13.7

8292. **H N. 40.** (AC = **H N. 40 = H N. 6 = Sh 379.**) 55 6
B was discovered by H (V), not having been seen by H and Sh. D was discovered by Langley in 1866 with the Harvard 15-inch. A comparison of my measures in 1878, 1881, and 1890 shows no change, and this is confirmed by the early measures of the bright stars. This group is in the well-known trifid nebula, *Messier* 20.

[H (**II, V, VIII**)....Hd....Hn (*Wash. Obsns.* 1874) (*Am. Jour. Sci.* **XIV**, 433) ...Tempel (2166)...Sp (I)...Cin^4...β^1...β^4...β (3048) (*Pub. L. O.* **II**)... Glasenapp (I)...See (3496)...]

8293. **Hn 32.** "Double" in *Cordoba Zones.* 55 15

1888.52	99°1	4″83	3*n*	Com

[β^4...Com (**VI**)...]

$55^{m}\ 17^{s}$ **8294.** **Arg. 31.** "Duplex" in O. Arg. S. This is in a fine cluster; many stars in the field. The components are Cord. DM (24°) 13783 and 13785. There is a 11 m star nearer A, 196°.9 : 28″.0.

1904.46	26°.9	35″.42	1*n*	β	8.0...8.7

[Cin5...β6...]

55 22 **8295.** **OΣ (App) 163.** B is Rad1. 3809. Change from proper motion.

1874.07	36°.9	59″.55	2*n*	Δ
1878.60	37.1	59.06	1*n*	Δ
1883.17	37.7	59.06	4*n*	Franz
1905.51	40.0	57.88	2*n*	β

[Δ (**I**)...Franz (2649)...Espin (*Mon. Not.* **LXIV**, 678)...β6...]

55 22 **8296.** **Weisse 32.** "Duplex" in W1 The 40-inch (1901) shows no near companion.

[β6...]

55 23 **8297.** **Σ 2261.** Fixed. The principal star is given a proper motion of 0″.065 in 180° (*A. G. Harvard*).

1866.64	262°.5	9″.51	3*n*	Δ
1905.51	262.1	9.32	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β6...]

55 33 **8298.** **β 1202.** Discovered with the 36-inch. There is a 13 m star, from C, 145°.0 : 15″.8.

A and B

1892.65	356°.8	0″.65	2*n*	Sp
1897.73	346.3	0.82	3*n*	A
1899.26	355.8	0.58	1*n*	β
1901.42	351.7	0.85	2*n*	Doo

C and D

1899.26	94°.6	3″.87	1*n*	β
1901.43	90.9	3.91	3*n*	Doo

AB and C

1899.26	28°.1	103″.85	1*n*	β

AB and E

1899.26	138°.2	90″.14	1*n*	β

β (**XVII**) ... β (3048) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) ... A (*A. J.* 429) ... Sp (**III**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

55 40 **8299.** 68 *Ophiuchi.* **β 1125.** Discovered with the 36-inch. The proper motion of the principal star is very small, 0″.012 in the direction of 256°.6 (Auwers). The relative change is slow, but there is not much doubt of these stars forming a physical system. The following are all the measures:

1889.39	14°.9	1″.01	5*n*	β
1890.47	19.7	0.91	3*n*	β
1892.37	22.0	0.89	4*n*	β
1894.13	14.9	0.78	4*n*	Sp
1897.51	10.5	0.99	3*n*	A
1898.52	15.3	0.86	3*n*	β
1898.53	16°.6	1″.02	3*n*	A
1900.14	18.6	0.88	2*n*	Lewis
1901.49	17.6	0.95	3*n*	Doo
1903.67	30.1	0.85	1*n*	Biesbroeck
1905.39	21.3	0.96	4*n*	Doo

Schiaparelli thought the principal star a close pair, 320°.0 : 0″.3± (1892.66). Aitken found it single with the 36-inch, with powers to 2400, in 1901; and no elongation seen with the 18½-inch by Doolittle in 1905.

[β (**XVI**) .... β (2956, 3048, 3142) (*Pub. L. O.* **II**) (*Pub. Y. O.* **I**) .... Lewis (*Mon. Not.* **LX**, 508; **LXI**, 486)...Biesbroeck...A (3466, 3585) (*Bul. L. O.* No. 11)... Doolittle (*Pub. Flower Obsy.* **II**)...]

8300. **O. Stone 40.** Since Part I was in type, I have found that this pair is identical with No. 8281, Probably fixed. $56^{m}\ :^{s}$

1897.71	162°.9	3″.38	2*n*	See

[Cin3...Cin4...See (3496)...]

8301. **Σ 2263.** (= **H II. 90 = S 697.**) Fixed. 56 6

1866.27	160°.7	7″.25	3*n*	Δ
1880.36	160.3	7.56	4*n*	Sp
1902.53	160.3	7.52	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Se...Wr...WS2...Δ (**II**)...Sp (**II**)...]

8302. 95 *Herculis.* **Σ 2264.** (= **H III. 26 = Sh 257.**) 56 24
Observers differ as to colors. Relatively fixed. The principal star has a proper motion of 0″.046 in 305°.6 (Auwers).

1868.30	261°.0	6″.03	4*n*	Δ
1883.69	260.4	6.15	8*n*	Sp
1887.55	259.6	6.22	3*n*	Hl
1902.53	260.2	6.34	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)...Ma (**X, XI, XIII, XV**)...BM (280)...H (**V**)...Bp... Da3...Wr...Se...Se2...Se3...Se (1017)...Ra (**XXI**)...Ba (**II**)...Kn... WS...Gl...Du...Hd...Pk...Waldo (2190)...Ferr...Δ (*Mem. Accad. Sci.*) ...Δ (1032)...Δ (**I, II**)...Sp (**II**)...Per...Per (2559)...Je (2369, 2449, 2772)... Hayn (3051)...Hl (**II**)...Knorre, See, Wellman (*Beob. Berlin*, No. 6, 1892)... Glasenapp (**III**)...Knorre (3518)....Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

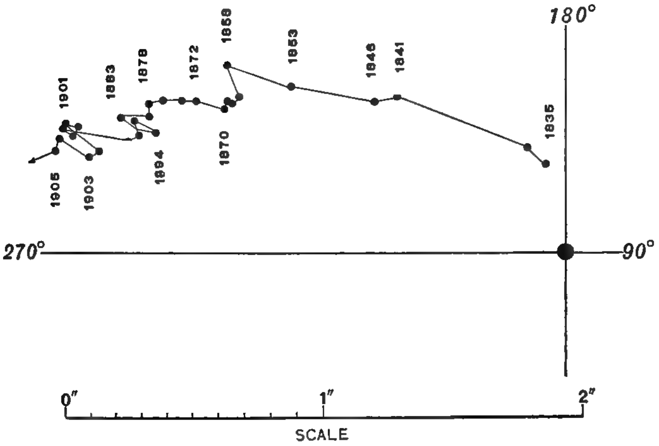
8303. τ *Ophiuchi.* **Σ 2262.** (= **H I. 88.**) Binary. 56 33
Several orbits have been computed, but the results are discordant, and of no value, as the arc described since the measures of Σ is less than 70°. The preceding observations were confined to single measures of the angle only, and are of but little use in determining the extent and form of the apparent ellipse. Although there is no doubt of the physical relation of the components, a straight line will represent all the measured distances down to this time about as well as any form of curve. It will probably require the measures of nearly another century to give the form of the apparent ellipse.

The following orbits have been found:

1846	Madler	87.03 yrs.	*Fixstern-System* I, 253
1848	Hind	104.	*Mon. Not.* IX, 145
1870	Doberck	185.2	*A. N.* 2037
1871	Doberck	217.87	*A. N.* 2041
1895	See	230.0	*Evolution of the Stellar Systems*
1896	Burnham	Indeterminate	*Pop. Ast.* IV. 347

The following positions are shown on the diagram:

1835.68	192°.9	0″.35	6*n*	Σ
1836.62	199.9	0.43	5*n*	Σ
1841.24	227.4	0.89	3*n*	OΣ
1846.71	231.9	0.94	4*n*	OΣ
1853.84	239.0	1.24	6*n*	OΣ
1858.42	241.0	1.50	4*n*	OΣ
1863.05	244.6	1.40	13*n*	Δ
1865.89	245.9	1.42	13*n*	Δ
1867.98	246.0	1.43	9*n*	Δ
1870.04	247.3	1.43	8*n*	Δ
1872.01	247.8	1.55	8*n*	Δ
1874.08	248.5	1.60	8*n*	Δ
1876.02	249.3	1.67	10*n*	Δ
1878.02	250.4	1.72	8*n*	Δ
1881.70	252.0	1.70	8*n*	Hl
1883.96	253.3	1.80	8*n*	Hl
1886.05	253.7	1.66	8*n*	Hl
1888.12	253.0	1.75	9*n*	Hl
1893.51	254.6	1.72	7*n*	Com
1894.05	255.7	1.75	7*n*	Coleman
1896.43	256.2	2.02	3*n*	Hu
1897.70	256.7	1.97	4*n*	Do
1899.64	255.7	1.96	3*n*	Hu
1901.09	255.6	2.01	5*n*	Lohse
1902.78	257.8	1.86	3*n*	Do
1903.61	258.7	1.89	4*n*	Biesbroeck
1904.25	257.4	2.02	8*n*	Lohse
1905.36	258.7	2.03	3*n*	β



τ Ophiuchi. Σ 2262

There is a distant 9.5 m star in the field:

1879.35	126°.9	100″.30	2*n*	β
1903.65	126.7	99.95	2*n*	Biesbroeck
1905.34	126.8	99.94	2*n*	β

[Ma (*F. S.* **I**)... Ma (430)... Ma (**IX, X, XI, XIII, XV**)...Σ^1... H (**VIII**)... Mh ...Mh (*Sid. Mess.* Sept. 1846)...Bp...Da^3...Se^1...Se^2...Se^3...Se (1614) ...Hind (*Mon. Not.* **IX**, 145)...J^2...J^3...WJ...WJ^2...Fl...K...K (1519)... Ba (**II, IV**)...Wn (**V**)...Hd...Flm...Kn...WS...WS^2...Gl...Sk...Sk^2... Sk^3...Pl...Ra (**XXX, XXXIII**)... Δ (1115, 1194, 1474, 1572, 1735, 1799, 1888, 1979, 2081, 2193)... Δ (I, II)...Do (2037, 2041, 2045, 2101, 2126, 2199, 2242, 2433, 3023, 3466, 3798, 3931)(*Trans. R. I. Acad.* **XXV**)(*Observatory* **II**, 209)(*Trans. R. I. Acad.* **XXIX**, Part 13)(*Mon. Not.* **XXXV**, 397)... En (2677, 2786)...Du ...Waldo (2190)...Pt...OΣ (**IX, X**)...Cin^3...Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})....Lv^1....Per....Per (2529)....Sp (2133).... Sp (I, **II, II** App.).... Je (2449, 2772)...β^2...β^3... de Ball (2753)...T (2866)... Hayn (3051)... Hl (*Wash. Obsns.* 1881–86)...Hl (**I, II**)...Collins (*Proc. Haverford Coll. Obsy.* 1891)... See (*Beob. Berlin* No. 6, 1892)... Glasenapp (**I, II, III, IV**)... Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 248)... Maw (**I, II, III, IV**)... Big... Big (*Bul. Ast.* **XII**, 299)...Sk^4...Searle (*A. J.* 299)...Collins (*A. J.* 378)...See (*A. J.* 359, 378)(*Evolution of the Stellar Systems*)...Com (**X**)...Schwarzschild (3335) ...β (*Pop. Ast.* **IV**, 347)...Hu (*A. J.* 397)... Pt (*A. J.* 397)... Lehman (*Pub. A. S. P.* **IX**, 141)...Morgan (*A. J.* 439)...Brown (3646)...Solá (3529, 3679)... Coleman (*Mem. R. A. S.* **LIII, LIV**)... Greenwich Obsy. (*Mon. Not.* **LX**, 509, 519; **LXI**, 486; **LXII**, 383)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)... *Annals Toulouse Obsy.* **III**... Boeger (*A. J.* 522)... Scott (*Mon. Not.* **LXIV**, 52)...Jouffray (*Bul. Ast.* **XXI**, 299)...Biesbroeck...β^6...]

8304. **β 635.** Discovered with the 18½-inch. C is DM (1°) 3566. The magnitudes of A and C in the DM are respectively 9.0 and 8.7. The following are all the other measures: $56^m\ 41^s$

A and B

1891.55	116°.3	1″.40	2*n*	β
1898.50	117.7	1.56	3*n*	A
1898.65	116.7	1.49	2*n*	Brown
1901.42	115.8	1.50	3*n*	Doo

A and C

1898.50	122°.2	69″.41	3*n*	A
1898.65	122.1	69.20	2*n*	Brown
1901.43	121.8	69.46	2*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...A (3585)... Brown (3646)... Doolittle (*Pub. Flower Obsy.* **II**)...]

8306. **β 1126.** (AC = **H 5009.**) The principal star of H 5009 was found to be a close pair with the 36-inch. This is in the cluster, *Messier* 8, and is described by Herschel as "the star *y* in the monograph of M 8" (*Cape Observations*). 56 53

A and B

1899.51	58°.3	0″.67	2*n*	A
1901.51	63.7	0.74	2*n*	Doo

AB and C

1837.70	20°.8	2″±	1*n*	H
1880.01	19.8	3.88	2*n*	Cin
1899.51	21.2	3.87	4*n*	A
1901.51	23.7	4.08	4*n*	Doo

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...Cin^5...Cin^6...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8307. **S 698.** "Measures excessively difficult." Many stars in the field, and several nearer than B. 56 57

1900.90	316°.5	29″.61	2*n*	β^5	7...8

8308. **Egbert 6.** This is certainly the same as Hd 148 (No. 8332), but places are roughly given in both catalogues, and it is impossible to identify without looking it up with a telescope. It may be one or the other of two small stars noted as double in the Cord. DM: 57 :

No. 12702	17h 58m 33s	−25° 19′
No. 12725	17 59 25	−25 31

The place given by Doolittle for the Egbert pair is 17^h 56^m 36^s −25° 29′, which is the place of Cord. DM (25°) 12650. The other measures are:

1868.60	14°9	5″35	1*n*	Hd	11 ...11
1880.58	15.9	4.46	1*n*	Cin	9.0... 9.2
1900.48	196.0	4.54	3*n*	Doo	9.2... 9.6

[Cin^5... Cin^6...Hd....Doolittle (*Pub. Flower Obsy.* I)...]

57^m 12^s **8309.** **Ho 76.** Probably unchanged.

1895.05	202°6	13″84	4*n*	Ho
1904.43	203.6	13.99	3*n*	Doo

A third star measured by Doolittle, 203°4 : 50″07 (1904.46) 1*n*.

[Ho (2778, 3558)...Perry (*Eng. Mech.* **XXXV**, 260)...]

57 14 **8310.** **Ho 563.** A third star 11 m, 248°4 : 68″07.

1904.47	201°0	0″70	3*n*	Doo

[Ho (3557)...]

57 15 **8312.** **H 5010.** "Double *f* the neb. M 8. Place from 9 *Sagittarii* by micrometrical measures."

1879.34	348°8	4″05	2*n*	Cin	9.2...9.7
1879.59	348.4	3.57	1*n*	Cin	
1897.67	349.9	3.65	1*n*	See	

[Cin^5...Cin^6...See (3496)...]

57 21 **8313.** **See 346.** The later measures are:

AB	1899.62	233°9	32″74	3*n*	Cg
AC	1899.62	100.7	47.92	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

57 26 **8314.** **OΣ (App) 164.** No change by the last measures:

1904.41	2°6	49″74	2*n*	β

[Δ (I)...β^6...]

57 31 **8315.** **H 2817.** Nothing but this since H:

1890.51	274°6	13″08	2*n*	Gla	9.5...10.1

[Glasenapp (I)...]

57 37 **8316.** **Ho 564.** The proper motion of the principal component from meridian observations is 0″660 in 148°0 (Porter). The following are all the measures:

1897.04	324°7	23″24	2*n*	Ho
1902.35	324.6	24.82	3*n*	Doo
1905.78	324.4	29.77	3*n*	β

The measures of 1897 and 1905 give 0″747 for the annual movement of A.

DM (26°) 3146, which is 26^s *p* and 4′5 *s* of Ho 564, was at first measured for that pair. It is not given in Part I.

1905.77	185°4	23″22	2*n*	β	8.3...11.5

[Ho (3557)...β^6...]

8317. **H 5013.** The only recent position is: 57^m 38^s

1901.49	338°5	13″42	2*n*	β^5	9.7...11.7

8319. **Σ 3129.** Unchanged. 57 41

1866.95	168°9	30″72	3*n*	Δ
1904.40	168.5	30.81	2*n*	β

[Ma (*F. S.* **II**)...Δ (II)...Cin^5...β^6...]

8320. **Σ 2271.** Very little change. There may be some increase in the distance. The proper motion in *A. G. Harvard* is 0″069 in 38°3. 57 41

1859.72	266°1	2″53	2*n*	Se
1869.03	264.8	2.23	5*n*	Δ
1872.80	265.9	2.39	2*n*	OΣ
1883.57	265.5	2.57	7*n*	En
1885.59	268.2	2.23	3*n*	Hl
1892.79	264.7	2.44	3*n*	Maw
1898.42	265.4	2.48	3*n*	Doo
1902.56	265.5	2.73	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...Se...Se^2...Du...Flm...Δ (**II**)...OΣ (**IX, X**) ... Seagrave (*Sid. Mess.* **II**, 22)... En (2677) ... Hl (*Wash. Obsns.* 1885) ... Hl (**II**)...Maw (**II, IV**)...Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)....Knorre (3632).... Doolittle (*Pub. Flower Obsy.* **I**).... *Annals Toulouse Obsy.* **III**....HΣ (**XII**).... Espin (*Mon. Not.* **LXII**, 529).... Boeger (*A. J.* 522)...]

8321. **Σ 2267.** The change, if any, is small. 57 48

1849.34	240°3	1″51	7*n*	OΣ
1866.32	239.7	1.06	3*n*	Δ
1882.08	240.5	1.16	6*n*	Hl
1887.58	237.8	0.90	2*n*	Sp
1895.49	243.4	1.16	2*n*	Gla
1900.60	244.3	1.03	3*n*	Doo
1902.48	244.9	1.09	1*n*	Hu

[Ma (*F. S.* **I**)....Ma (**X, XI, XIII, XV**)...Se... OΣ (**IX, X**)... Δ (1194)... Δ (**I, II**)... Flm... WS^2... Sk^2... Sp (**II, II** App.) ... Hl (*Wash. Obsns.* 1884) .. Hl (**I, II**) ...Per...Per (2748)...Sp (2133)...Ho (2978)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Glasenapp (**IV**)... Lewis (*Mon. Not.* **LX**, 509)... Doolittle (*Pub. Flower Obsy.* **I**) .... Boeger (*A. J.* 522) .... Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

8322. **Ho 77.** Probably unchanged. 57 49

1902.34	314°5	2″14	3*n*	Doo

[Ho (2778, 3558)...]

8323. **Σ 2270** *rej.* This is a pair of small stars in the field with, and *f*, Σ 3129. 57 59

1904.40	213°9	6″18	2*n*	β^6	9.5...9.6

8324. **Σ 2265.** Fixed. 58 15

1867.85	282°8	23″84	4*n*	Δ
1902.53	282.5	24.07	2*n*	Hu
1905.72	282.6	23.96	2*n*	β

[Ma (*F. S.* **II**)...Δ (II)...Cin^5...β^6...]

$58^m\ 20^s$ **8325.** **β 825.** (AC = **Σ 2268** = **S 699.**) The faint star nearly midway between the components of Σ 2268 was discovered with the 15½-inch at the Washburn Observatory. The change in AC is evidently due to the proper motion of one of these stars. Assuming that this is the principal star, the measures give a movement of about 0″.05 in the direction of 350°.

A and B

1888.66	193°.1	11″.52	2*n*	Com
1889.00	195.1	11.47	3*n*	HΣ
1890.46	194.7	11.30	5*n*	β
1898.38	194.1	11.85	5*n*	Doo

B and C

1898.48	231°.0	9″.30	3*n*	Doo

A and C (= Σ 2268)

1829.70	218°.2	18″.13	2*n*	Σ
1866.52	214.0	19.32	6*n*	Δ
1881.37	212.5	20.08	3*n*	β
1890.13	211.5	20.08	6*n*	β
1898.38	210.7	20.63	5*n*	Doo
1902.89	210.5	20.80	2*n*	Hu

[β (**XII**) ...β^4... β (2957, 3114)(*Ast. and A.-P.* **XIII**, 17)(*Pub. L. O.* **II**) ... Com (**VI**) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ...]

General references:

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Δ (**II**) ... Δ (1572) ... Sp (**II**) ... Big ... Gl ... WS ... WS^2 ... Pt ... Glasenapp (**IV**) ... Do (3931) ...]

58 21 **8326.** **Ho 565.** The only other measure is:

1902.42	66°.4	0″.37	3*n*	Doo

[Ho (3557) ... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**) ...]

58 23 **8327.** **Σ 2266.** Fixed.

1868.22	184°.0	8″.48	4*n*	Δ
1902.15	184.4	8.84	2*n*	Hu

[Ma (*F. S.* **I**) .... Ma (**XI**) .... Δ (**II**) .... Hl (*Wash. Obsns.* 1886) .... Hl (**II**) .... Cin^5 ....]

58 29: **8328.** **Σ 2299** *rej.* The only measure is:

1905.47	309°.9	33″.94	1*n*	β^6	8.7...8.7

58 35 **8329.** **Σ 2273.** (= **Sh 259.**) Fixed.

1866.16	284°.4	21″.04	3*n*	Δ
1895.60	284.0	21.28	2*n*	Gla
1905.51	284.3	21.03	1*n*	β

There is a 12 m star near C:

1905.51	265°.4	23″.68	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... *Gr. Obsns.* 1840 ... Ra (**XXIV**) ... Δ (1194) ... Δ (**I, II**) .... Glasenapp (**IV**) .... *Annals Toulouse Obsy.* **III** .... Espin (*Mon. Not.* **LXIV**, 677) .... β^6 ....]

58 43 **8330.** **Σ 2269.** There may be a little change in the distance.

1868.57	163°.0	20″.49	4*n*	Δ
1905.38	163.7	21.14	2*n*	β

[Ma (*F. S.* **II**) ... Ma (**XIII**) ... Δ (**II**) ... Cin^5 ... β^6 ...]

8331. **β 1127.** Discovered with the 12-inch. Change is still uncertain. The magnitude in DM is 6.5, and in Radcliffe 7.2. $58^m\ 59^s$

1889.53	144°.7	0″.80	3*n*	β	7.8... 9.7
1895.65	147.4	0.86	3*n*	A	7.8...10.2
1897.71	130.5	0.88	3*n*	A	
1898.61	139.6	0.74	1*n*	Bowyer	
1898.77	141.4	0.70	3*n*	Lewis	
1905.38	133.8	0.87	4*n*	Doo	

[β (**XVI**) ... β (2956)(*Pub. L. O.* **II**) ... A (*A. J.* 429)(*A. S. P.* **VII**, 305) ... Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 509) ...]

(See p. 1079)

8332. **Hd 148.** See No. 8308. 59 .

8333. **Lewis 18.** Must be near β 1127, but presumably not that pair, as both are given in the measures (*Mon. Not.* LX, 509). 59 :

8335. **Ho 426.** No material change. 59 6

1902.52	196°.2	12″.46	4*n*	Doo
1905.76	197.8	12.06	3*n*	β

[Ho (3234, 3558) ... β^6 ...]

8337. **Σ 2275.** The measures are discordant, and change uncertain. 59 20

1844.35	126°.8	0″.8 ±	1*n*	Ma
1859.89	141.1	0.45	1*n*	Se
1878.59	128.4	1.13	1*n*	OΣ
1882.54	138.9	0.98	1*n*	OΣ
1884.50	150.2	0.92	5*n*	En
1892.60	134.7	0.94	2*n*	Big
1894.57	135.6	0.69	6*n*	Com
1901.46	133.1	0.66	3*n*	Lewis

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Δ (1736) ... Flm ... OΣ (**X**) ... En (2677) ... Sp (**II**) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... Com (**X**) ... Brown (3646) ... Lewis (*Mon. Not.* **LIX**, 400; **LXII**, 383) ... Biesbroeck ...]

8338. **Doo 10.** From *Pub. Flower Obsy.* I. There is no star in this place in the DM. 59 20

8339. **H 5016.** Cin^5 has angle only 89°.0 (1879.48), and magnitudes, 9...12. The principal star is 7.9 in DM. 59 22

1904.42	88°.8	12″.15	2*n*	β^6	8.6...11.0

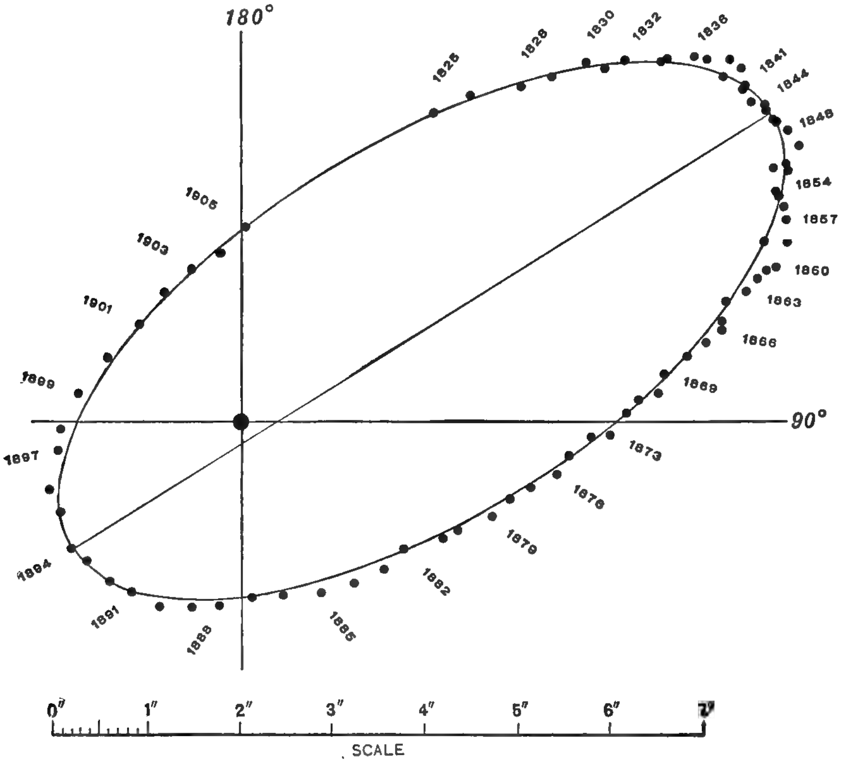
8340. 70 *Ophiuchi.* **Σ 2272.** (= **H II. 4** = **Sh 258.**) Nearly one revolution has been made since the first measures of Struve, and the elements of the orbit are very accurately known. It is never a difficult pair, and the measures are very numerous. 59 23

The system has a large proper motion:

Auwers	1″.126 in 170°.0
Boss	1.123 in 169.9

The following orbits have been found:

1830	Herschel	80.34 yrs.	*Mem. R. A. S.* V, 217
1831	Encke	73.86	*B. J.* 1832
1831	Encke	79.09	*B. J.* 1832
1836	Madler	80.61	*A. N.* 289; *B. J.* 1839
1841	Madler	92.87	Ma (IX, p. 183); *A. N.* 444
1846	Jacob	87.52	*Bishop's Obsns.* p. 138
1848	Hind	88.48	*Mon. Not.* IX, 145
1851	Villarceau	92.34	*Comp. Rend.* XXXII, 51
1852	Klinkerfues	95.97	*A. N.* 1135
1854	Powell	98.15	*Mon. Not.* XV, 42
1855	Jacob	93.10	*Mon. Not.* XV, 228
1866	Schur	94.37	*A. N.* 1681
1873	Flammarion	92.77	*Comp. Rend.* LXXIX, 1248
1876	Tisserand	94.93	Flm, p. 166
1877	Plummer	94.44	*Oxford Obsns.* No. 1
1887	Gore	87.84	*Mon. Not.* XLVIII, 257
1890	Mann	88.04	*Sid. Mess.* IX, 390
1892	Burnham	87.75	*Ast. and A.-P.* XII, 585
1893	Schur	88.39	*A. N.* 3220
1895	See	87.70	*Evolution of the Stellar Systems*
1895	See	88.39	
1896	Doolittle	86.66	*A. J.* 400



70 Ophiuchi. Σ 2272

On the diagram 78 yearly mean positions are shown, 1825 to 1905, from the measures of the best observers. Very few positions have been used which are not derived from a mean of several nights. Altogether, the positions shown represent complete measures on 1918 nights, giving an average of more than 24 nights for each yearly mean. These results are as follows:

1825.57	148°.2	3″.98	14*n*	Σ
1827.02	145.1	4.37	2*n*	Σ
1828.71	140.2	4.78	4*n*	Σ
1829.59	138.1	5.08	6*n*	Σ
1830.64	136.3	5.44	18*n*	Σ, Da, Bes
1831.60	134.3	5.54	12*n*	Σ, Bes
1832.62	133.4	5.75	8*n*	Da, Bes
1834.55	130.8	6.04	18*n*	Σ, Bes, Da
1835.60	130.7	6.11	5*n*	Σ
1836.52	128.9	6.34	25*n*	Σ, Ma, Ek, Bes
1837.64	127.9	6.45	27*n*	Σ, Ek, Da, Bes
1838.57	126.6	6.64	7*n*	Galle
1839.58	125°.5	6″.66	4*n*	Galle, Da
1840.53	125.7	6.57	14*n*	OΣ, Da
1841.64	124.0	6.60	26*n*	Ma, Da, Bes, K
1842.57	123.8	6.57	55*n*	OΣ, Ma, Da, K, Bes
1843.55	122.1	6.57	19*n*	Ma, Ek
1844.44	121.3	6.66	10*n*	Ma, Ek
1845.48	120.9	6.64	30*n*	OΣ, Ma, Hind
1846.58	119.8	6.65	10*n*	Ma
1847.42	119.5	6.67	12*n*	OΣ, Ma
1848.93	118.2	6.74	9*n*	OΣ, Ma
1850.55	116.4	6.78	18*n*	Ma, Fl, Ra, WJ
1851.54	115.4	6.57	19*n*	Ma, Fl
1852.69	114.9	6.56	37*n*	OΣ, Ma, Fl, J
1853.58	115.5	6.42	12*n*	Δ, Da
1854.47	113.4	6.34	52*n*	OΣ, Δ, Da, Ma, J

1855.58	112°9	6′35	11*n*	Ma, Da, Se, Wn
1856.43	111.7	6.34	32*n*	OΣ, Δ, Se, Wn, J, Ma
1857.52	110.5	6.31	20*n*	OΣ, Da, Δ, Se, J, Wn, Wr
1858.39	109.1	6.01	18*n*	Δ, Ma, J, Wr
1859.66	108.4	6.24	20*n*	OΣ, Ma, Da, P, Auwers
1860.61	106.3	6.07	3*n*	Se
1861.67	106.2	5.95	17*n*	Ma, Ra, P, Auwers
1862.59	105.6	5.83	19*n*	OΣ, Δ, Ma, Wn
1863.53	104.5	5.69	27*n*	Δ, Se, Hl, Adolph
1864.54	104.1	5.43	13*n*	Δ, En
1865.50	102.0	5.34	41*n*	Δ, En, Se, K
1866.41	101.1	5.33	20*n*	Δ, OΣ, Hd, Se
1867.53	99.8	5.12	12*n*	Δ, Kn, Hd
1868.65	98.6	4.90	22*n*	Δ, Kn, Du, OΣ, Ra, Bru
1869.80	96.7	4.64	11*n*	Δ, Du
1870.51	94.1	4.55	8*n*	Δ
1871.56	93.4	4.34	21*n*	Δ, Du, Kn, Gl, WS, Ra, Hd
1872.51	91.6	4.20	23*n*	Δ, OΣ, Bru, Ferr, WS, Ra
1873.56	88.1	4.01	14*n*	Δ, Ra, Gl, WS, Tal
1874.61	87.7	3.81	17*n*	Δ, OΣ, Ra, Gl, Tal
1875.52	84.2	3.59	21*n*	Δ, Sp, Ra
1876.57	80.7	3.48	31*n*	Δ, Sp, Hl, Je, Pl, Do, Hd, Schur
1877.60	77.4	3.23	50*n*	Δ, Sp, Hl, Je, Pl, Do, Schur, Cin
1878.58	74.3	3.05	18*n*	Δ, Do, Sk, Goldney
1879.57	69.5	2.93	47*n*	Sp, Hl, Je, Cin, Sk
1880.59	64.0	2.64	33*n*	Sp, Hl, Je, Do, Sk, Franz
1881.56	60.3	2.55	11*n*	Do, Hl, Big, Sk
1882.60	52.5	2.26	26*n*	Sp, Hl, Je, En, Do
1883.61	44.6	2.24	39*n*	Sp, Hl, Je, Per, En
1884.61	35.6	2.17	26*n*	Sp, Hl, Per, En
1885.61	25.9	2.06	26*n*	Sp, Hl, Per, En, Je
1886.61	14.2	1.95	45*n*	Sp, Hl, Per, En, Je, HΣ
1887.66	4.0	1.92	32*n*	Sp, Hl, T, HΣ
1888.62	353.6	2.02	34*n*	Hl, Maw, T, Com, Lv, Giac, HΣ, Sp
1889.56	345.5	2.09	36*n*	β, Com, Hl, Maw, HΣ, Sp
1890.59	336.7	2.19	35*n*	Sp, Hl, Gla, Schur, Maw, Giac
1891.59	327.2	2.20	29*n*	Sp, Hl, HΣ, Big, Maw, See
1892.56	320.9	2.24	39*n*	Sp, β, Big, Maw, Schur, Com
1893.65	312.4	2.26	23*n*	Sp, Com, Schur, Coleman
1894.68	307.0	2.30	35*n*	Sp, Com, Schur, Big, Knorre, Coleman
1895.61	297.0	2.20	28*n*	Sp, A, Com, Ho, See, Maw
1896.60	289.7	2.21	44*n*	A, Com, Hu, Lewis, Bowyer, Lv, See, Brown
1897.63	279.3	2.02	35*n*	A, Hu, Doo, Do, Pt
1898.43	272.8	1.98	16*n*	A, Hu, Coleman
1899.54	260.6	1.82	41*n*	A, Hu, Doo, Lohse, Schur, See, Maw, Coleman, Brown
1900.51	245.3	1.61	35*n*	A, Hu, Doo, Lohse, Maw, Bowyer
1901.65	227.1	1.55	51*n*	A, Hu, Lohse, Maw, Bowyer
1902.67	211.4	1.65	33*n*	A, Hu, Lohse, Do, Bowyer
1903.55	198.7	1.74	92*n*	A, Doo, Do, Lohse, Bowyer, Biesbroeck
1904.52	187.7	1.87	60*n*	Lohse, Salet, Biesbroeck
1905.45	179.1	2.11	5*n*	β

It was long ago suggested, from certain supposed irregularities in the measured positions, that one or the other component was attended by a dark, or hitherto unseen companion, All the large refractors in the last thirty years have failed to show, under the most favorable conditions, any elongation in either member of the system, or any third star, close or otherwise. For further information on this subject, reference is made to *Evolution of the Stellar Systems*, and *Popular Astronomy*, III, 229. It is very probable, to say the least, that the apparent variations in the angle and distance of the companion may be explained by the ordinary errors of observation. It will be seen that the mean results shown furnish no evidence of any disturbing body. In fact, they are rather unusually consistent and accordant, and it is not unlikely that if a considerable part of the other measures were rejected in the investigation, as they should be in any determination of the elements of the orbit, the suspected variable movement would largely disappear.

The ellipse shown on the diagram gives a period of 86.70 years.

Several faint stars in the field have been measured. The change corresponds to the proper motion of the principal star.

A and *a*

1878.84	197°8	71′38	3*n*	Hl
1882.79	197.8	65.60	2*n*	Hl
1886.53	200.4	62.50	3*n*	Hl
1889.30	203.3	59.45	2*n*	β
1899.43	209.7	51.95	1*n*	Brown
1905.60	214.1	47.29	4*n*	β

A and *b*

1905.56	252°1	69′96	1*n*	β

A and *c*

1905.59	73°1	105′00	2*n*	β

A and *d*

1878.84	49°6	87′21	3*n*	Hl
1882.79	47.5	92.40	2*n*	Hl
1886.52	45.0	93.56	3*n*	Hl
1889.30	43.2	95.17	2*n*	β
1897.51	38.1	98.68	3*n*	Doo
1905.60	35.9	105.12	4*n*	β

A and *e*

1905.59	103°1	120′33	2*n*	β

A and *f*

1905.62	329°0	142′42	1*n*	β

A and *g*

1886.52	224°0	165′92	3*n*	Hl
1905.62	229.8	155.85	1*n*	β

[Ma (*F. S.* **I**, p. 270)....Ma (289, 324, 430, 444, 452, 490)....Ma (**IX, X, XI, XIII, XV**)...Ma (*Beiträge zur physischen Kenntniss der himmlischen Körper*, Weimar, 1841)...Σ^{1}...Bes...Bes (343)...H (*Mem. R. A. S.* **V**, 217)...H^{1}... H^{2}...H (**VII**)...Ek (**I, III**)...Ek (*Berlin Jahr.* 1832)...Bp...Da^{1}...Da^{2}... Da^{3}...Da^{4}...Da (*Mem. R. A. S.* **V**, 139)...Wr... Mh... K... K (409, 467, 472, 1519)...P^{1}...P^{2}... P (*Mon. Not.* **XV**, 41)...WJ...WJ^{2}... J^{2}... J^{3}... J (*Brit. Ass'n Rep.* 1855–58).... J (*Mon. Not.* **XIV**, 242; **XV**, 228).... Hind (*Mon. Not.* **IX**, 144) .... Fl.... Fl (*Mon. Not.* **XI**, 40; **XVI**, 161) .... Fl (772) ....*Durham Obsns.* 1846–48....Bond (*Am. Acad.* **II**, 144)....Houzeau (496, 498)... Se... Se^{1}... Se^{2}... Se^{3}... Se (975, 1614) (*Comp. Rend.* **XLI**, 271) ... Krueger (1210, 1403) parallax...Wh...Adolph (1690)...Klinkerfues (990, 1135) ...Auwers (1393)...Lu (1103)...Lu (**I, II, III**)...Schmidt (1543)...Wn (**V**)... Wn (1738)...Villarceau (*Comp. Rend.* **XXXII**, 50)...En (1518, 1674, 2677, 2742, 2786)...Ferr...Du...Hd...Pk...Bru...Ba (**I, II, III, IV**)...Ra (**XXI, XXVII, XXVIII, XXXI, XXXIII, XXXIV, XXXV, XXXVIII, XLVII**)...Pl...Bru^{2}... Schur (1681, 1747, 2255, 2719, 3220, 3231)... Kn... Gl... WS...WS^{2}... Sk...

Sk^2....Sk^3....Δ (*Mem. Accad. Sci.*)....Δ (1032, 1115, 1194, 1474, 1573, 1735, 1799, 1888, 1979, 2081, 2193)...Δ (**I, II**)...OΣ (**IX, X**) ... Flm... Flm (*Études et Lectures sur l'Astronomie* **VI**).... Flm (*Comp. Rend.* **LXXIX**, 1246).... Big...Pt... Seagrave (*Sid. Mess.* **II**, 258) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2199, 2242, 2433, 3023, 3466, 3931)... Waldo (2190)... Kustner (2584)... Sp (2133)... Sp (**I, II, II** App.) ... Franz (2590)... Per ... Per (2529, 2685, 2748) .... Goldney (2257)....Je (2369, 2449, 2772, 3802)....Sadler (*Sid. Mess.* **V**, 219)...Hl (**I, II**)...Hl (*A. J.* 202)...Hl (*Wash. Obsns.* 1863, 1880–86) ...Cin^4... Cin^5... Cin^6... Lv^1...Wilson (Cin^{10})... Com (**VI, X**) ... T (2898, 2991, 3185)...Mann (*Sid. Mess.* **IX**, 390)...Knorre, See, Wellman (*Beob. Berlin*, No. 6, 1892)... Giacomelli (**III**)...Collins (*A. J.* 278, 378)(*Proc. Haverford Coll. Obsy.* 1891, 1892)...Jones (*A. J.* 312)...Gore (*Mon. Not.* **XLVIII**, 257)....Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 248)....β^1....β^2....β (2930, 2957, 3142)(*Pub. L. O.* **II**)(*Ast. and A.-P.* **XII**, 585)... Callandreau (*Bul. Ast.* **XII**, 523)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Sk^4...Sk^5...Everett (*Mon. Not.* **LVI**, 464)...Knorre (3300, 3339)...Ebell (3321)...Schwarzschild (3335)... Searle (*A. J.* 299)... Lv (*A. J.* 389, 407)... Pt (*A. J.* 397)... Glasenapp (**I, II, III, IV, V**)....Wagner (*A. J.* 410)....Soulé (*A. J.* 410)....Pt (*A. J.* 411).... Lehman (*Pub. A.S. P.* **IX**, 141) .... Scott (*Brit. Ast. Ass'n* **VIII**, 66)(*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Morgan (*A. J.* 439)...Brown (3646)...Solá (3529, 3679).... Ho (3558).... Moulton (*A. J.* 461) .... Gl (*Mon. Not.* **LXI**, 556).... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Sp (**III**)... Boeger (*A. J.* 522)... Thiele (3837)....Coleman (*Mem. R. A. S.* **LIII, LIV**)....Biesbroeck....Salet (*Bul. Ast.* **XXII**, 108)...Maw (**I, II, III, IV**) ... Greenwich Obsy. (*Mon. Not.* **LIV**, 317; **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802) ... Lewis (*A. J.* 388)... Hu (*A. J.* 397, 427) ... Doolittle (*A. J.* 400, 416, 547) (*Pop. Ast.* **III**, 329)(*Pub. Flower Obsy.* **I, II**)...See (3314)(*A. J.* 349, 358, 359, 378, 384, 463)(*Evolution of the Stellar Systems*)...A (3396, 3466, 3585, 3639) (*A. J.* 429)(*Pub. A. S. P.* **VII**, 305; **XV**, 217)(*Bul. L. O.* No. 11).... Schur 3324, 3405, 3469, 3621)(*A. J.* 304)..Lohse (*Pub. Potsdam Obsy.*)...β^6...]

(See p. 1079)

$59^m\ 35^s$ **8341.** **H 2818.** The magnitude in SD is 9.0. The only measure is the following:

1890.56	142°0	18″10	2*n*	Gla	7.8...9.9

[H (**VIII**)...Glasenapp (**I**)...]

59 39 **8342.** **H 592.** The later observations are:

1830+	207°2	30±″	1*n*	H	8-9...10-11
1890.49	206.6	36.44	2*n*	Gla	8.0... 9.2

[H (**V**)...Glasenapp (**I**)...]

59 47 **8343.** **Σ 2274** *rej.* The only measure since Struve is:

1905.62	283°9	16″78	2*n*	β^6	8.2...10.5

59 54 **8344.** **OΣ 534.** Found independently by Δ (1979) and recorded as new, and so credited by OΣ (X, p. 136). This pair was measured by Se, but called OΣ 341, another pair in the same field. The components are fixed.

1873.52	275°2	2″16	5*n*	Δ
1898.34	274.7	2.24	4*n*	Hu

[OΣ (**IX**)(**X**, pp. 136, 200) ... Δ (1979) ... Δ (**I**) ... Se ... Per ... Per (2560) ... OΣ (*Mon. Not.* **XX**, 9)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**, p. 161)...Bryant (*Mon. Not.* **LXIII**, 403)...]

0 . **8345.** **Lewis 19.** No other measures. Place approximate.

[Lewis (*Mon. Not.* **LIX**, 418)...]

0 : **8346.** **O. Stone 41.** Place approximate; "near H 592." No. 8342.

[Cin^5...Cin^6...]

8347. **Σ 2277.** *Herculis* 401. B. A. C. 6129. Very little change. The principal star has a proper motion of 0″017 in 96°7 (Battermann). $0^m\ 1^s$

1866.74	119°8	27″16	3*n*	Δ
1896.57	121.1	27.28	2*n*	Hu
1902.48	121.2	27.04	1*n*	Hu

Glasenapp measures a distant star, 284°5: 87″99 (1897.64) 2*n*.

[Ma (*F. S.* **I**)... Ma (**XI**)... Ra (**XXIV**)... Flm... Δ (1209)... Δ (**I, II**)... Du... Hu (*A. J.* 397) ... Glasenapp (**IV, V**) ... *Annals Toulouse Obsy.* **III** ... Espin (*Mon. Not.* **LXII**, 529)...Coleman (*Mem. R. A. S.* **LIV**)...]

8348. **Σ 2276.** (= **H III. 56 = Sh 260.**) Fixed. In one measure in Ma (XV) called Σ 2176. 0 8

1864.93	257°7	6″61	3*n*	Δ
1889.71	258.2	6.89	5*n*	Giacomelli
1904.39	257.9	7.04	1*n*	Hu

[Ma (304, 324)...Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H (**IV**)... Se...Mh... Wr...Ra (**XXI**)...Δ (1032, 1116)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Du... WS...WS^2...Gl...Giacomelli (**III**)...Sp (**II**)...Wellman (*Beob. Berlin*, No. 6, 1892)...Glasenapp (**I, II, III, IV**)...Solá (3529) ...Knorre (3518)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

(See p. 1079)

8349. **OΣ (App) 165.** No change. 0 8

1900.48	141°9	65″98	1*n*	β

[Δ (**I**)...β^6...]

8350. Noted "double" in *Washington Transit Zones.* 0 9

1904.72	63°2	13″25	2*n*	Cogshall	7.5...11.0

[Cin^4...]

8352. **Ho 78.** Fixed. 0 29

1904.50	199°8	7″64	3*n*	Doo

[Ho (2778, 3234)...]

8353. **OΣ 341.** For many years after the discovery of this pair, there was no apparent change, but between 1887 and 1898 a double occultation took place, and the smaller component was again seen on the following side where all the previous measures had been made. Evidently the real orbit is a very elongated ellipse, the plane of which is nearly in the line of sight. Hussey suggests that a period of about 240 years will account for the observed positions. The measure by Secchi, credited to this pair, belongs to OΣ 534, which is in the same field. 0 44

1843.34	94°0	0″33	2*n*	Ma
1849.18	93.4	0.49	6*n*	OΣ
1869.47	89.0	Obl.	6*n*	Δ
1878.27	84.0	0.4±	3*n*	Sp
1883.12	87.5	0.44	2*n*	OΣ
1884.10	91.3	0.42	6*n*	Per
1886.39	86.3	0.56	7*n*	En
1887.08	96.7	0.58	3*n*	HΣ
1898.31	Single		1*n*	A
1898.33	Single		4*n*	Hu
1898.75	74.0	0.10	3*n*	Hu

1899.61	86°2	0″18	4*n*	Hu
1899.77	100.9	0.17	1*n*	Bryant
1900.46	92.4	0.26	3*n*	Hu
1900.62	84.6	0.24	3*n*	A
1900.68	77.0	0.26	2*n*	Bryant
1901.51	93.6	0.33	2*n*	Hu
1901.56	88.3	0.49	1*n*	Lewis
1901.60	86.5	0.32	6*n*	Bryant
1903.47	94.4	0.36	2*n*	Biesbroeck
1903.59	93.4	0.32	1*n*	Bowyer
1905.41	91.0	0.40	2*n*	A

[Ma (**XI**)... OΣ (**IX, X**)... Δ (I)...Sp (**II**)...Per... Per (2560, 2685)... En (2786) ....Greenwich Obsy. (*Mon. Not.* **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)... Hu (*Pub. L. O.* V)(*Pub. A. S. P.* **X**, 121; **XII**, 38)... A (*Bul. L. O.* No. 11)... HΣ (**XII**)... Biesbroeck...]

(See p. 1079)

9^m 47^s **8354.** **Σ 2278.** (= **OΣ** (**App**) 166.) No sensible change.

A and B

1866.70	23°5	38″37	3*n*	Δ
1869.61	23.7	38.28	4*n*	Du
1905.78	24.6	37.72	2*n*	β

B and C

1868.63	146°9	5″92	4*n*	Δ
1869.41	147.6	6.08	5*n*	Du
1905.78	146.6	6.07	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)... H^1... H^2... Bp... Se... Ra (**XXIII**)... Δ (1194)... Δ (I, **II**).... Nobile (*Rend. della R. Accad. Sci.* Napoli, Dec. 1877)....Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Seagrave (*Sid. Mess.* **II**, 22)... Ba (**II, III**)... Du... Pl... Bl (**V**)... Franz (2649)... *Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 529)...β^6...]

55 **8355.** **β 243.** Discovered with the 6-inch. Evidently unchanged.

A and B

1878.58	125°8	0″84	2*n*	Cin	8.0...8.7
1897.65	124.1	0.52	1*n*	See	7.9...8.3
1898.52	125.4	0.92	3*n*	Doo	7.9...8.0

A and C

1898.52	56°5	40″17	3*n*	Doo	...9.0

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^4... Cin^4...Cin^5... See (3496)...Doolittle (*Pub. Flower Obsy.* I)...]

1 1 **8356.** **β 244.** Discovered with the 6-inch. No motion.

1881.59	258°2	2″03	3*n*	β
1892.54	257.9	2.04	2*n*	Lv
1897.63	257.6	2.38	3*n*	See
1903.51	259.4	2.30	6*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^4...Cin^3...Cin^4...Cin^6...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... See (3496)... Doolittle (*Pub. Flower Obsy.* **II**)...]

1 13 **8357.** **Σ 2284.** Unchanged.

1867.09	193°2	3″60	3*n*	Δ
1894.63	192.9	3.81	2*n*	Gla

[Ma (*F. S.* **II**)... Ma (**XI, XIII**)... Se... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (**II**)...Glasenapp (**III**)...]

8358. **β 418.** Discovered with the 6-inch. No sensible change. There is an error of 180° in the angle as printed in β (VII). 1^m 28^s

1893.44	228°4	14″60	3*n*	Wilson
1899.32	227.8	14.60	1*n*	β
1901.54	226.8	14.55	2*n*	Doo

[β (**VII**)... β (2103)... β^3...Wilson ( )... Doolittle (*Pub. Flower Obsy.* **II**)...]

8359. 72 *Ophiuchi.* **OΣ 342.** (AD = **H** 5943.) The principal star was thought to be a close pair by OΣ in 1841. It was examined on various occasions subsequently by the same observer, and at times measured, and at other times found to be single. Other observers have examined this star with like contradictory results. In the last thirty years special attention has been given to this star with all the large American refractors, and particularly at the Lick Observatory, and at no time has there been any suspicion of a close companion, or of any elongation in the principal star. As Hussey in his catalogue of the OΣ stars has given all the positive and negative results of the observations of this star in the last sixty years, it is not necessary to cite them here. There is no probability of this being really double, notwithstanding the measures recorded by several experienced observers. 1 40

The faint star C was first noted by Newcomb with the Washington 26-inch when looking for B. The only other measure of this is:

1904.92	300°4	25″35	2*n*	β	...14

The following are all the measures of the Herschel companion:

1878.62	167°6	51″70	1*n*	β	
1900.92	166.8	53.77	2*n*	β	...10.8

The change in distance is due to the proper motion of the large star, 0″116 in 318°5 (Auwers).

[OΣ (**IX, X**)... Ma (**XI, XIII**)... Da^3... Δ (**I**, p. 229)... Se... Se^2... Newcomb (*Wash. Obsns.* 1874)...WS...WS^2... Sk^2... Flm...Sadler (*Ast. Reg.* **XXII**, 216)... Per... Per (2560)... Sp (2133)... En (2678)... Hl (**I**)... β^1... β^3... β (2957)(*Pub. L. O.* **II**)... A (3396).. Hu (*A. J.* 427)(*Pub. L. O.* **V**)... HΣ (**XII**)...β^6...]

8360. **Σ 2279.** Fixed. 1 42

1866.66	181°8	12″94	3*n*	Δ
1902.62	181.2	13.37	1*n*	Hu
1905.78	181.6	13.19	2*n*	β

[Ma (**XI**)...Ma (*F. S.* I)... Δ (**II**)...Glasenapp (**V**)...β^6...]

8361. **H 1313.** The only measure is: 1 42

1893.56	310°9	8″68	1*n*	Big

[Big (*Bul. Ast.* **XII**, 299)...]

8362. **A. G. 216.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 1 43

8363. **Ho 79.** The only later position is: 1 47

1904.48	15°8	0″45	3*n*	Doo

[Ho (2778)... Doolittle (*Pub. Flower Obsy.* **II**)...]

1m 47s **8364.** **OΣ 343.** Apparently without change. The measure in Ma (XIII), 120°8 : 0″90 (1845.70) 1*n*, evidently belongs to some other pair.

1867.53	74°4	2″62	4*n*	*Δ*
1898.41	76.0	2.83	3*n*	Hu

[OΣ (**IX**) . . . *Δ* (**I**) . . . Lewis (*Mon. Not.* **LXI**, 486) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . .]

1 57 **8365.** **Ho 427.** No motion.

1904.53	70°9	11″51	3*n*	Doo

[Ho (3234) . . .]

2 4 **8367.** **β 636.** Discovered with the 18½-inch; the distart star with the 40-inch.

A and B

1885.51	127°9	5″12	2*n*	HΣ
1892.55	123.2	4.60	2*n*	Ho
1898.31	124.0	4.70	2*n*	β
1898.52	123.6	4.73	5*n*	Doo
1898.67	126.0	4.66	1*n*	Brown
1901.60	123.9	4.62	2*n*	Doo

[β (**X**) . . . β1 . . . Ho (3234) . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . . HΣ (**XII**) . . . Brown (3646) . . .]

2 5 **8368.** **β 826.** Discovered with the 15½-inch at the Washburn Observatory. Change is doubtful. There is a 7 m star 5′3 *n*. The later measures are:

1893.52	333°2	0″59	2*n*	Lv	9.8 . . . 9.9
1893.57	150.9	0.78	1*n*	Wilson	9.5 . . . 9.6
1896.70	331.5	0.71	2*n*	A	9.5 . . . 9.5
1903.49	329.2	0.65	3*n*	Doo	
1905.36	327.7	0.75	1*n*	A	

[β (**XII**) . . . . β4 . . . . Lv (*A. J.* 382) . . . . Wilson (   ) . . . . A (3396) . . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . .]

2 17 **8369.** **H V. 74.** (= σ 505.) The following are all the observations since 1783:

1879.35	137°1	42″66	1*n*	Cin6	6.0 . . . 9.0
1903.56	137.1	41.85	2*n*	β6	6.7 . . . 9.5

2 18 **8370.** **OΣ 524.** Probably slow retrograde motion.

1870.82	68°8	Obl.	5*n*	*Δ*
1878.92	70.5	0″4 ±	3*n*	Sp
1881.13	72.8	0.42	2*n*	OΣ
1887.46	64.0	0.35 ±	3*n*	HΣ
1894.78	63.7	0.39	2*n*	Big
1898.39	59.9	0.32	3*n*	Hu
1903.48	55.9	0.29	1*n*	Biesbroeck

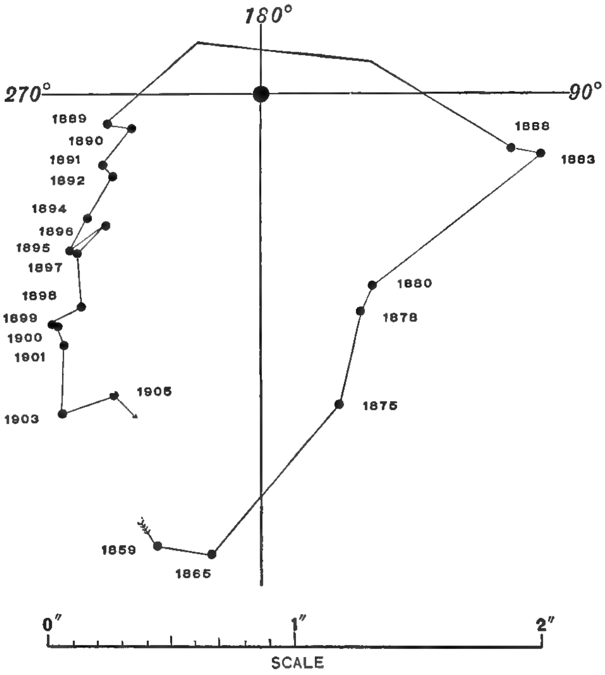
[OΣ (**IX, X**) . . . . *Δ* (**I**) . . . . Flm . . . . Sp (**II**) . . . . Big . . . . Big (*Bul. Ast.* **XII**, 299) . . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . . Biesbroeck . . .]

2 21 **8371.** **β 245.** (= **Hd 149.**) *Sagitturii* 46. Discovered with the 6-inch. The subsequently published observations of the Harvard Observatory show that it had been seen there previously. There is probably no change. This star is B. A. C. 6145.

1888.53	361°9	4″11	1*n*	Lv
1892.52	353.3	3.98	[illegible]	Lv
1893.66	350.4	3.87	3*n*	Sellors
1894.58	352.7	3.93	4*n*	Scott
1903.00	353.8	3.97	6*n*	Doo

[β (**V**) . . . β (*Mon. Not.* **XXXV**, 31) . . . Hd . . . Cin4 . . . Lv1 . . . Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892) . . . Sellors (3154, 3240) . . . Scott (*Brit. Ast. Ass'n* **VI**, 249)(*Mon. Not.* **LXIV**, 52) . . . See (3496) . . . Do (3798) . . . Innes (*Mon. Not.* **LXI**, 604)(*Annals Cape Obsy.* **II**) . . .]

8372. 99 *Herculis.* **A. C. 15.** The companion has made nearly one revolution since it was discovered by Alvan Clark in 1859 at the observatory of Dawes with his 8¼-inch refractor. 2m 28s



99 Herculis. A.C.15

There are but few measures in the first thirty years, and none at all during 180° of the angular motion. The following orbits have been published:

1890	Gore	53.55 yrs.	*Mon. Not.* LI, 55
1895	See	57.5	*Evolution of the Stellar Systems*
1895	See	54.5	
1900	Aitken	63.0	*Pub. A. S. P.* XII, 240
1901	Doberck	64.52	*A. N.* 3912

The proper motion of the system is given:

Auwers	0″135 in 301°7
Paris	0.115 in 310.5

The following are all the measures:

1859.63*	347°1	1″71	2*n*	Da
1865.16*	353.9	1.90	3*n*	OΣ
1875.06*	14.0	1.32	2*n*	OΣ
1878.46*	24.4	0.99	3*n*	β

1880.18*	29°.9	0″.91	3*n*	β
1881.43	29.4	0.51	1*n*	β
1883.65*	77.6	1.17	2*n*	OΣ
1888.54*	77.4	1.05	1*n*	OΣ
1889.50*	281.2	0.65	1*n*	β
1890.45*	285.1	0.56	3*n*	β
1891.56*	294.4	0.72	3*n*	β
1892.40*	299.2	0.70	3*n*	β
1894.73*	305.7	0.88	1*n*	Com
1895.30	307.0	0.84	1*n*	See
1895.46*	309.5	1.04	6*n*	Barnard
1895.62	297.2	0.89	1*n*	Ho
1895.65	293.4	(0.34)	2*n*	Lewis
1895.73	315.2	1.12	2*n*	See
1895.73	313.4	....	2*n*	Moulton
1895.80*	309.6	1.00	3*n*	Com
1896.62	305.0	0.85	2*n*	Lewis
1896.65	311.9	1.07	3*n*	Com
1896.70*	310.3	0.84	3*n*	A
1897.54*	311.1	1.00	4*n*	A
1898.33*	320.2	1.15	3*n*	β
1898.42	312.0	0.99	1*n*	Lewis
1898.66	308.8	0.99	1*n*	Bryant
1899.29*	319.7	1.23	2*n*	Hu
1899.34*	317.3	1.25	3*n*	A
1899.41*	317.7	1.37	3*n*	Doo
1899.61	309.5	0.98	1*n*	Lewis
1900.54*	319.0	1.27	4*n*	A
1901.48	319.6	1.07	1*n*	Lewis
1901.53*	322.1	1.31	4*n*	A
1903.50	314.8	1.33	1*n*	Bowyer
1903.37*	332.2	1.54	7*n*	Doo
1903.71*	324.5	1.40	3*n*	Biesbroeck
1905.66*	334.2	1.37	2*n*	β

[Da (*Mon. Not.* **XX**, 55)....Da4....Flm....Flm (*Observatory* **III**, 25)....Hd.... Waldo (2190)...Gore (*Mon. Not.* **LI**, 45)...OΣ (**X**)...β1...β3...β4...β (2213, 2875, 3048, 3114, 3142)(*Pub. L. O.* **II**).... Everett (*Mon. Not.* **LVI**, 464).... Ho (3558)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 509; **LXII**, 383; **LXIV**, 802) ....Com (**X**).... See (*A. J.* 349, 359, 366)(*Evolution of the Stellar Systems*)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)... Barnard (*A. J.* 447)....Hu (*Bul. L. O.* 44)....Do (3912).... Biesbroeck....β5....β6.... A (3396, 3466, 3639)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **XII**, 240)...]

2m 37s **8373.** **Barnard 9.** (AC = **H 5026.**) "Coarse double; in a neb.," H. The nebula is Dreyer 6559. The nearest companion was discovered by Barnard with the 36-inch (*A. J.* 447). No other measures.

2 37 **8374.** **H 1314.** The later observations are:

1873.41	151°.3	16″.60	1*n*	Δ	9.5...10.0
1880.56	152.8	16.80	1*n*	Big	9.5...10.7
1905.81	152.3	17.23	1*n*	β	9.6...10.2

[Δ (I)...Big...β6...]

2 38 **8375.** **Σ 2282.** Unchanged.

1868.63	90°.1	2″.46	5*n*	Δ
1888.68	90.0	2.60	2*n*	HΣ

[Ma (*F. S.* **I**)...Ma (**XI**)...H1...Ra (**XXV**)...Se...Δ (1125)...Δ (I, **II**)...Du... Ba (**II, III**)....WS2....Bl (**V**)....Glasenapp (**III**)....Knorre (3632)....*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

8376. **Ho 428.** No change. 2m 39s

1904.49	81°.9	0″.81	4*n*	Doo

[Ho (3234)...]

8377. 100 *Herculis.* **Σ 2280.** (= **H III. 41** = **Sh 262.**) 2 59
Relatively fixed. Several faint stars in the field. The proper motions are given by Auwers:

A = 0″.028 in 28°.3
B = 0.037 in 316.5

1865.52	182°.8	14″.02	3*n*	Δ
1890.63	182.7	14.05	4*n*	Giacomelli
1898.05	182.2	13.81	6*n*	Coleman
1905.76	182.4	14.00	3*n*	β

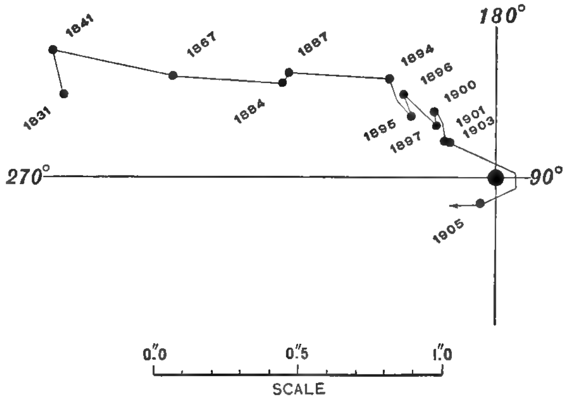
[Ma (*F. S.* **I**)... Ma (304, 324)... Ma (**XI, XII, XIII, XV**)...Bes... Ek (**I**)...K... K (409)....Auwers (1393)....Wr (*Phil. Trans.* 1851)....Pogson (*Brit. Ass'n Rep.* 1858)...Wh...Lu (1103)...Lu (**I, II, III**)...Se1...Ra (**XXI**)... Hd... Ba (**I, II, III**)...Da4...Waldo (2190)...Giacomelli (**III**)...Δ (1209)...Δ (**I, II**)... WS...Gl... Je (2369, 2449)... En (2677)... Glasenapp (**III**) ... Cohn (3240) ... *Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...β6...]

8378. **Perry.** Not in DM, but about 1m *f* DM (9°) 3565. 3 :

1901.49	313°.1	3″.32	2*n*	β	10.2...11.0

[Perry (*Eng. Mech.* **XXV**, 260)...β5...]

8380. 73 *Ophiuchi.* **Σ 2281.** (= **H I. 87** = **Sh 261.**) 3 36
Probably binary, but the motion of the companion to 1903 is practically rectilinear. It is now a close and difficult pair.



73 Ophiuchi. Σ 2281.

If a physical system, as is most likely to be the case from the last position in 1905, the period will be unknown probably for another century. The proper motion is small, 0″.022 in 119°.5 (Auwers).

1783.35	265°.7	....	2*n*	H
1831.05	259.7	1″.54	3*n*	Σ
1841.26	254.2	1.61	5*n*	OΣ
1867.67	253.2	1.18	5*n*	Δ
1884.21	248.3	0.81	9*n*	Per
1884.23	245.3	0.81	6*n*	Hl
1887.17	243.9	0.81	3*n*	HΣ
1894.61	228.1	0.5±	2*n*	Gla
1895.73	236.5	0.36	9*n*	Com

1896.59	229°.2	0″.43	2*n*	Lewis
1897.20	231.4	0.27	5*n*	A
1900.57	224.8	0.31	3*n*	Bowyer
1901.63	236.2	0.22	1*n*	Bryant
1903.62	234.6	0.20	3*n*	Bowyer
1905.70	327.9	0.10	1*n*	A

The last measure was made with the 36-inch under favorable conditions, and the quadrant appeared to be correct.

[Ma(*F. S.* **I**)...Ma(304, 324, 430)...Ma(**IX, X, XI, XIII**)...H (**V**)...Σ^1...Mh...Wr...Fl...J^2...Bp...Da^3...Se^2...Se^3...Se (1017)...Ba (**II**)...Hd...Du...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199)...WS...WS^2...Gl...Sk....Big....Flm....OΣ (**IX, X**)....En (1518, 1674, 2677)....Δ (*Mem. Accad. Sci.*)...Δ (1036, 1116, 2195)...Δ (I, **II**)...Sp (2133)...Sp (**II**)...Hl (*A. J.* 302)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (**I, II**)...T (2866)...Per...Per (2529, 2685, 2748)...Glasenapp (**III**)...A (3396, 3466)...Com (**X**)...Hu (*A. J.* 427)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)...Coleman (*Mem. R. A. S.* **LIII**)...Sk^5...Solá (3679)...HΣ (**XII**)...Biesbroeck...]

3m 38s **8381.** **S 700.** I noticed a star 11 m from A, 310°: 15″; and a fourth more distant, nearly *s* (1876). It is called "quadruple" in H (V). These are all the later measures:

A and B

1879.58	291°.8	18″.70	1*n*	Cin	...10.0
1890.53	291.6	18.77	2*n*	Gla	7.7... 9.6
1904.64	289.9	18.30	3*n*	Miller	

A and C

1879.58	353°.8	29″.05	1*n*	Cin	... 8.0
1890.53	352.7	28.17	2*n*	Gla	... 7.9
1904.63	352.8	28.20	2*n*	Miller	

[H (**V**)...Cin^5...Glasenapp (**I**)...]

3 38 **8382.** 102 *Herculis.* **A. G. Clark 8.** Discovered by Alvan G. Clark with the 12-inch now at the Lick Observatory. The principal star has a proper motion of 0″.015 in 212°.9 (Auwers). No change.

1900.45	136°.2	23″.60	2*n*	A	...13.0
1900.76	135.7	23.55	3*n*	β	...12.9

[β (*Am. Jour. Sci.* April, 1879)...β^1...A (*Bul. L. O.* No. 11)...β^6...]

3 39 **8383.** **Σ 2290.** Apparently fixed.

1867.23	356°.8	3″.96	4*n*	Δ
1902.62	353.5	4.06	1*n*	Hu
1904.67	352.5	3.81	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...HΣ (**XII**)...]

3 43 **8384.** **Σ 2283.** Perhaps some change in angle.

1832.60	91°.9	1″.20	6*n*	Σ
1842.72	94.3	1.13	2*n*	Ma
1849.12	90.0	1.17	4*n*	OΣ
1856.89	91.4	1.04	2*n*	Se
1864.64	88.6	0.99	3*n*	Δ
1875.83	87.8	0.93	4*n*	Sp
1886.53	84°.2	1″.05	5*n*	Per
1894.51	84.7	0.86	2*n*	Gla
1897.62	85.8	1.01	3*n*	Brown
1901.77	79.6	0.97	2*n*	Hu
1902.05	82.5	1.06	10*n*	Bowyer

[Ma (*F. S.* **I**)...OΣ (**IX**)...Ma (**X**)...Se...Δ (1209)...Δ (**I, II**)...Per...Sp (**II**)...Glasenapp (**III**)....Brown (3646)....Greenwich Obsy. (*Mon. Not.* **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 802)...Biesbroeck...]

8385. **Σ 2285.** The angle by Struve appears to be too large, as there has been no change since 1866. The measures by Lewis and Dyson belong to some other pair. 3m 45s

1866.35	332°.7	3″.53	3*n*	Δ
1887.64	331.6	3.58	2*n*	HΣ
1900.83	333.4	3.47	2*n*	β

[Ma (**XI, XIII, XV**)....Ma (*F. S.* **I**)....Δ (**II**)....Lewis (*Mon. Not.* **LIX**, 400)....HΣ (**XII**)...β^5...]

8386. **Hu 195.** (AC = **H 593.**) The principal star of H 593 was found to be a close pair by Hussey. 3 45

1901.51	75°.8	1″.14	1*n*	β	...11.5

The following are all the measures of the Herschel companion:

1890.54	300°.9	17″.26	2*n*	Gla	8.1...9.0
1900.56	301.8	18.07	1*n*	Hu	8.5...9.5
1901.48	302.2	18.11	2*n*	β	8.2...9.5

[Hu (*Bul. L. O.* No. 44)(*A. J.* 485)...Glasenapp (**I**)...β^5...]

8387. **β 759.** (AC = **H 5028.**) The duplicity of the principal star of Herschel's pair was discovered with the 6-inch at Mt. Hamilton in 1879. C is Cord. G. C. 24740. 3 49

A and B

1887.30	122°.0	2″.13	3*n*	Pol
1896.65	119.7	1.76	3*n*	See

A and C (= H 5028)

1886.60	148°.7	15″.27	1*n*	Pol	...9
1889.40	147.3	14.92	3*n*	β	...9.0
1896.67	149.7	15.43	1*n*	See	...9.5

[β (**XI**)...β^2...β (2957)(*Pub. L. O.* **II**)...Pollock (*Pub. Sydney Obsy.* 1891)(*Mon. Not.* **XLVII**, 473)(*Mem. R. A. S.* **L**)....See (3496)....Herschel (*Cape Obsns.*)...Scott (*Mon. Not.* **LXIV**, 52)...]

8388. **β 637.** Discovered with the 18½-inch. The principal star has a considerable proper motion: 3 54

Boss	0″.185 in 166°.0
Porter	0.179 in 180.0

It is obvious from the measures that the companion is moving with it.

1885.54	193°.1	6″.96	3*n*	HΣ
1891.64	194.9	7.33	2*n*	β
1898.51	194.4	7.01	3*n*	β
1898.52	191.8	7.55	2*n*	Doo
1901.58	192.9	7.41	3*n*	Doo

[β (**X**)....β^1....β (3114)(*Pub. L. O.* **II**)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy.* **I, II**)...]

4^m 7^s **8390.** **β** 132. B. A. C. 6158. Discovered with the 6-inch. The measures appear to show slow retrograde motion.

1875.91	238°.9	0″.75	3*n*	Sp
1881.58	237.0	0.79	3*n*	β
1887.53	229.4	0.64	2*n*	Sp
1891.51	230.5	0.83	3*n*	β
1892.52	227.8	0.89	2*n*	Lv
1892.64	228.7	1.00	2*n*	T
1895.54	222.4	0.77	3*n*	A
1896.50	224.5	0.94	3*n*	Lv
1904.23	223.1	0.90	9*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....β^4....β (3114)(*Pub. L. O.* **II**).... Δ (I).... Δ (2086) ... Sp (2133) ... Sp (**II**, App.) ... Cin^4... Sp (**III**)... Lv^1...Lv (*A. J.* 278, 407)(*Proc. Haverford Coll. Obsy.* 1892) ... T (3186)... A (*A. S. P.* **VII**, 305).... Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52) .... Doolittle (*Pub. Flower Obsy.* **II**)...]

4 7 **8391.** **OΣ** 344. Change doubtful.

1867.54	148°.2	2″.22	4*n*	Δ
1898.52	146.3	2.17	5*n*	Hu
1900.52	144.7	2.27	7*n*	Doo

[Ma (**XI**)... OΣ (**IX**, **X**)... Δ (**I**)... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **I**, **II**)...HΣ (**XII**)...]

(See p. 1079)

4 17 **8392.** **Σ 2286.** Struve's angle seems to be too large, as there is no change in the last forty years.

1831.68	322°.0	2″.42	3*n*	Σ
1865.64	315.1	2.53	3*n*	Δ
1887.65	315.0	2.64	2*n*	HΣ
1888.65	317.0	2.57	3*n*	Hl
1896.59	316.4	2.23	2*n*	Pt
1901.77	315.4	2.68	2*n*	Hu
1903.45	315.9	2.66	2*n*	Do

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (2195)... Δ (**II**)... Flm ... Pt ... Cin^5... Hl (**II**)... Pt (*A. J.* 397)...HΣ (**XII**)...Do (3931)...]

4 19 **8393.** **β** 638. (AB = **Σ 2287** *rej.*) The wide pair was rejected by Σ in *Mensurae Micrometricae.* The smaller component was found to be double with the 18½-inch. The measures show no change.

B and C

1893.50	5°.5	1″.48	4*n*	Lv
1898.50	7.3	1.77	4*n*	Doo
1903.54	8.6	1.58	3*n*	β
1905.50	7.2	1.76	3*n*	Doo

A and B (= Σ 2287 *rej.*)

1863.63	150°.8	22″.22	1*n*	Hl
1893.51	152.0	21.86	3*n*	Lv
1898.50	151.4	22.01	4*n*	Doo
1903.54	151.7	22.36	2*n*	β

The 40-inch shows a 14 m star near A, 339°.0:13″.5 (1903).

[β (**X**)....β^1....Lv (*A. J.* 382)....Doolittle (*Pub. Flower Obsy.* **I**)....Hl (*Wash. Obsns.* 1863)(**I**, p. 134)...Brown (3646)...β^6...]

4 22 **8394.** **Σ 2288** *rej.* Magnitudes in Σ, 7–8...10; in *Pos. Med.* and W^1 8m. I called it 8½ (1875). The observation in H (VII) as of Σ 2287 *rej.*, belongs to this pair.

1903.53	59°.9	15″.75	3*n*	β	8.7...11.1

[Hl (*Wash. Obsns.* 1863)(**I**, p. 134)...β^6...]

4^m 24^s **8395.** **H** 5030. Nothing since Herschel but this:

1901.42	287°.3	41″.94	2*n*	β^5	6...10.8

4 45 **8396.** **H** 2820. Nothing later but the following:

AB	1901.49	278°.8	5″.65	2*n*	β^5	9.5...10.7
AC	1901.49	83.2	12.98	2*n*	β^5	...10.8

4 47 **8397.** **Ho** 80. No other measures. Not seen by Hough 1893–97.

[Ho (2778, 3558)...]

4 47 **8398.** **Σ** 2289. Perhaps a little change in the angle.

1841.11	239°.2	1″.34	5*n*	OΣ
1857.08	236.1	1.06	4*n*	Se
1865.53	236.0	1.19	6*n*	Δ
1875.56	231.2	1.13	4*n*	Sp
1882.12	231.7	1.10	6*n*	Hl
1890.69	231.5	1.06	3*n*	Maw
1895.65	233.6	1.38	2*n*	Gla
1900.02	232.6	1.08	7*n*	Bowyer
1902.53	228.6	1.21	10*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**IX**, **X**, **XI**, **XIII**, **XV**)...H^1...Se...Se^2...Flm...Du...Hd... En (1674, 2677)... Δ (1116, 1194, 1474)... Δ (**I**, **II**)...OΣ (**IX**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199)...Giacomelli (**III**)...Callandreau (*Bul. Ast.* **XII**, 523)...WS...WS^2...Gl...Sk...Je (2449, 2772, 3802)...T (2898)...Per... Per (2529, 2685)...Hl (*Wash. Obsns.* 1884)...Hl (**I**, **II**)...Sp (**II**)...Glasenapp (**I**, **III**, **IV**)....Maw (**I**, **III**)....Big (*Bul. Ast.* **XII**, 299)....Sk^4....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383, **LXIII**, 403; **LXIV**, 802)...Collins (*A. J.* 378)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

4 53 **8398½.** **Ho** 267. Later measures give smaller distance.

1902.93	354°.3	14″.04	4*n*	Doo

[Ho (2977)...]

4 54 **8399.** **A** 237. Other small stars in the field, the nearest, 91°: 9′. No other measures of the close pair.

[A (3784)(*Bul. L. O.* No. 16)...]

4 57 **8400.** **Ho** 429. Fixed.

1902.40	23°.8	3″.61	6*n*	Doo

[Ho (3234)...Lv (*Proc. Haverford Coll. Obsy.* 1892)(*A. J.* 278)...Doolittle (*Pub. Flower Obsy.* **I**)...]

5 18 **8402.** **H** 1315. The only measures are:

1893.56	134°.0	9″.54	1*n*	Big

[Big (*Bul. Ast.* **XII**, 299)...]

5 35 **8403.** **Lv** 7. Discovered by Leavenworth.

1899.62	278°.3	3″.86	4*n*	Hu	7.5...11.5

[Lv (*Proc. Haverford Coll. Obsy.* 1892)(*A. J.* 278)...Hu (*Bul. L. O.* No. 44)...]

$5^{m}\ 53^{s}$ **8404.** **Σ 2291.** The distance seems to be increasing.

1868.02	339°2	25″90	4*n*	Δ
1901.03	339.2	26.80	3*n*	β

[Ma (*F. S.* I)...Ma (XI)...Bl (V)...Flm...Δ (2195)...Δ (II)...Big...β5...]

5 54 **8405.** **H 1821.** The only later measures are:

1901.98	278°0	7″81	2*n*	β^{5}	9.2...9.6

SD (16°) 4756 is 53″16 from A in the direction of 13°5 (1901.98) 2*n*.

5 58 **8406.** **A 36.** "This is 65″3 distant in the direction of 42°3 from a 7m star." No other measures.

[A (3635)(*Bul. L. O.* No. 11)...]

5 58 **8407.** **Ho 81.** No motion.

1904.43	211°0	2″52	3*n*	Doo

[Ho (2778, 3558)...]

6 28 **8411.** **A 238.** No other measures. Several faint stars near.

[A (3784)(*Bul. L. O.* No. 16)...]

6 35 **8413.** *μ Sagittarii.* **β 292.** (AB = **H** 5035; AD = **H** 2822.) The faint star C, between A and E, was noted with the 26-inch at Washington. The bright star has a proper motion of 0″027 in the direction of 280°7 (Auwers). This is too small to say with certainty whether or not the companions have the same movement.

The principal star is a spectroscopic binary, discovered by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XIX, 351).

A and B (= H 5035)

1836.50	259°9	16″08	1*n*	Lam
1879.37	257.7	16.66	1*n*	β
1880.00	258.6	16.96	2*n*	Cin
1892.56	258.6	17.12	2*n*	Lv
1897.71	258.1	17.24	3*n*	See
1901.57	258.3	16.99	3*n*	Doo

A and C

1892.57	117°4	23″73	1*n*	Ho
1897.73	120.7	25.98	1*n*	See
1899.55	119.0	25.92	1*n*	β
1901.55	118.4	25.58	2*n*	Doo

A and D (= II 2822)

1847.3	312°9	48″57		Jacob
1890.46	312.0	48.70	2*n*	Gla
1892.57	311.9	48.78	1*n*	Ho
1901.57	312.5	48.40	3*n*	Doo

A and E

1847.3	115°4	50″54		Jacob
1892.56	116.0	49.96	1*n*	Lv
1892.57	114.8	50.02	1*n*	Ho
1901.57	115.0	49.94	3*n*	Doo

[β (V)...β (*Mon. Not.* **XXXV**, 31)...β1...β3...Ho (3234)...See (3496)...Jacob (*Mem. R. A. S.* **XVII**)...Lamont (*Analen Königsberg Sternwarte* **XVII**)...Cin4...Cin5...Cin6...Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...WS...WS2...Glasenapp (I)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8414. **β 131.** The close pair was discovered with the 6-inch, and in measuring that, the third star C was added with the 18½-inch. So far there is no evidence of change. $6^{m}\ 42^{s}$

A and B

1880.53	279°7	2″58	2*n*	β
1892.53	280.2	2.76	2*n*	Lv
1892.57	278.5	2.60	1*n*	Ho
1898.63	279.4	2.80	3*n*	Cogshall
1899.62	278.5	2.85	4*n*	Hu

A and C

1892.57	278°5	7″02	1*n*	Ho
1898.63	283.7	7.40	2*n*	Cogshall
1899.65	281.6	8.02	1*n*	Hu

[β (III)...β (*Mon. Not.* **XXXIV**, 59)...β3...Δ (I)...Δ (2086)...Cin4...Cin6...Lv1....Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)....Ho (3234)....Cogshall (*A. J.* 478)...Hu (*Bul. L. O.* No. 44)...]

(See p. 1079)

8415. **H 594.** No measures in H; described as "triple," with R. A. uncertain. Found and identified as here given. Measures from Se1. Probably fixed. 6 43

AB	1905.63	123°1	7″72	2*n*	β	8.5...8.7.
AC	1905.63	239.0	13.46	2*n*	β	...9.2

[Se1...Se3...Cin4...β6...]

8416. **Hu 674.** No other measures. 6 45

[Hu (*Bul. L. O.* No. 57)...]

8417. **Σ 2293** *rej.* The only measure is: 6 46

1902.62	263°8	13″07	1*n*	Hu

8418. **OΣ 345.** Probably fixed. 6 57

1867.62	65°6	1″28	4*n*	Δ
1876.70	64.3	1.22	1*n*	OΣ
1885.41	60.7	1.28	2*n*	Per
1898.51	62.2	1.34	3*n*	Hu
1901.63	66.0	1.18	3*n*	Doo

[Ma (XI)...OΣ (IX, X)...Δ (I)...Per...Per (2749)...Brown (3646)...Hu (*Pub. L. O.* V)...HΣ (XII)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8419. **Hn 141.** Nothing later but this: 7 0

1904.77	28°1	1″60	1*n*	Miller

[Hn (*Pub. Washburn Obsy.* **II**)...Com (VI)...]

8420. **Σ 2302.** *Draconis* 159. No material change. (See No. 9082). 7 16

A and B

1868.60	247°7	5″55	4*n*	Δ
1897.54	245.4	5.85	2*n*	Gla

A and C

1866.64	281°.1	23″.09	3*n*	Δ
1897.55	279.4	23.03	2*n*	Gla

[Ma (*F. S.* **I**, 35, 58)...Ma (**XI**)...Δ (**II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (3023)...Glasenapp (**V**)...]

(See p. 1079)

$7^{m}\ 21^{s}$ **8421.** **Σ 2292.** No change since Struve.

1870.72	263°.5	1″.19	6*n*	Δ
1883.53	263.9	1.26	3*n*	Per
1899.50	264.2	1.20	2*n*	Gr. Obsy.
1902.74	262.3	1.22	2*n*	Do

[Ma (*F. S.* **I**)....Ma (**X**)....Se....Δ (1125)....Δ (**I, II**)....Du....OΣ (**IX**)... Giacomelli (**III**)...Sk²...Sp (**II**)... Per...Per (2529)... Collins (*A. J.* 378)... Glasenapp (**IV, V**)...Greenwich Obsy. (*Mon. Not.* **LX**, 509)... Do (3931)...]

7 23 **8422.** **Ho 82.** The only other measure is:

1896.77	214°.8	0″.57	1*n*	Ho

[Ho (2778, 3558)...]

7 38 **8423.** **See 348.** Discovered by Cogshall. His later measures are:

1899.65	302°.0	0″.96	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

7 44 **8424.** **A 239.** (ABD = **Σ 2300** *rej.*) The nearest of the Struve companions was discovered by Aitken to be double in 1901. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

7 52 **8425.** **H 2825.** The magnitude in DM is 9.0. The only observations since H are:

AB	1893.55	28°.5	15″.55	1*n*	Big	
	1905.76	27.8	15.20	1*n*	β	8.7...11.0
AC	1893.55	345.1	93.80	1*n*	Big	
	1905.76	344.8	93.37	1*n*	β	... 8.7

C is DM (22°) 3305.

[Big (*Bul. Ast.* **XII**, 299)...β⁶...]

7 55 **8426.** **H 2823.** Later observations give:

1880.51	332°.3	20″.34	2*n*	Cin	
1890.53	331.0	20.18	2*n*	Gla	9.3...9.4

[Cin⁵...Cin⁶...Glasenapp (**I**)...]

7 58 **8427.** **Hn 142.** Later measures give:

1899.55	246°.5	0″.98	3*n*	Hu

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Hu (*Bul. L. O.* No. 44)...]

$8^{m}\ 4^{s}$ **8428.** **Σ 2295.** One of the stars seems to have a proper motion of about 0″.02 along the line joining the components.

1831.41	173°.9	11″.60	3*n*	Σ
1866.17	172.4	11.14	3*n*	Δ
1880.40	171.4	10.70	2*n*	β
1905.67	173.0	10.12	4*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...β⁸...β⁶...]

8 4 **8429.** 16 *Sagittarii.* **β 286.** Discovered with the 26-inch at the Naval Observatory. Auwers gives the proper motion of A 0″.029 in the direction of 241°. If the small star was fixed in space, the effect of the movement would be to decrease the distance of B. The reverse of this appears to be shown by the measures, and it is probable that the components are moving together.

These are all the later measures:

1891.63	216°.0	6″.03	2*n*	β
1897.73	217.2	6.22	1*n*	See
1898.66	213.5	5.93	3*n*	Boothroyd
1905.64	218.0	6.16	1*n*	β

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β¹...β (3114) (*Pub. L. O.* **II**)...See (3496) ...Boothroyd (*A. J.* 478)...β⁶...]

8 17 **8431.** **H V. 93.** The components are DM (28°) 2955 and 2956. Bigourdan has measured another pair, unless error in reducing distance. The following are all the observations since 1783:

1880.40	136°.4	54″.88	3*n*	β	7.7...7.9
1893.56	136.4	25.72	1*n*	Big	
1901.21	136.4	54.70	2*n*	β	

[β³...Big (*Bul. Ast.* **XII**, 299)...β⁶...]

8 23 **8432.** **H 856.** The R. A. in H¹ is about 2ᵐ too small. Noted as double in Schjellerup. Motion doubtful.

1830.47	68°.3	27″.28	1*n*	H	8 ...8+
1879.36	63.7	25.82	2*n*	Cin	7.5...8.0
1890.53	244.0	24.88	2*n*	Gla	9.2...9.4
1903.54	63.2	24.76	2*n*	β	8.7...8.8

[H¹...Cin⁵...Glasenapp (**I**)...β⁶...]

8 25 **8433.** **Σ 2294.** The change is principally in distance. The measures are discordant.

1841.55	87°.8	1″.04	1*n*	OΣ
1856.85	93.4	0.62	3*n*	Se
1865.80	84.2	0.85	1*n*	OΣ
1866.21	87.8	0.7 ±	2*n*	Δ
1872.56	84.9	0.66	1*n*	OΣ
1876.53	84.9	0.4 ±	11*n*	Sp
1883.36	110.1	0.36 ±	4*n*	Sp
1884.67	71.1	0.50	7*n*	En
1897.64	105.5	0.20	1*n*	Hu
1897.91	100.6	0.27	9*n*	A
1903.55	103.0	0.29	2*n*	A

[Ma (*F. S.* **I**) ... Ma (**X, XI**) ... Se ... OΣ (**IX**) ... Δ (**II**) ... Flm ... Sp (2133)... Sp (**II**)...Pt...Per...Per (2748)...En (2677, 2742, 2786)...Glasenapp (**III, IV**) ...A (3396, 3466, 3639)...Hu (*A. J.* 427)...Bryant (*Mon. Not.* **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...HΣ (**XII**)...]

(See p. 1079)

8^m 27^s **8434.** See 349. Other measures at the Lowell Observatory:

1899.66	130°1	10″09	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8 32 **8437.** **A. G. 217.** Both stars in *A. G. Harvard.* Measures by Espin (3717).

8 35 **8438.** **β 1091.** Discovered with the 12-inch. All the other measures are given.

1896.69	25°4	0″66	1*n*	Lewis
1898.60	29.8	0.45	5*n*	A
1900.52	29.4	0.36	3*n*	Doo
1900.78	33.9	0.28	4*n*	Bryant
1903.73	32.1	0.40	1*n*	Biesbroeck
1905.63	23.0	0.38	4*n*	Doo

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 409; **LXI**, 486; **LXII**, 383) ... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)... Biesbroeck...A (3585)...]

8 50 **8439.** **Ho 268.** No measures. Always seen single at the Flower Observatory.

[Ho (2977)...]

8 51 **8440.** **Σ 2298.** Little, if any, change.

1866.71	180°9	2″37	3*n*	*Δ*
1888.69	179.7	2.30	2*n*	HΣ

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Du ... Bl (**V**)... *Δ* (**II**) ...WS...WS^2... Gl...HΣ (**XII**)....]

9 1 **8441.** **40 and 41** *Draconis.* **Σ 2308.** (= **H IV. 67 = Sh 267.**) A very slow decrease in the angle and distance. The proper motions are given:

40 *Draconis* (B)	0″142 in 23°7	Auwers
	0.142 in 23.8	Bossert
41 *Draconis* (A)	0.136 in 22.0	Auwers
	0.140 in 21.9	Bossert

1864.30	234°6	20″25	5*n*	*Δ*
1877.27	234.7	20.18	6*n*	Je
1883.43	234.8	20.13	6*n*	En
1887.18	234.1	20.06	3*n*	Eng

[Ma (*F. S.* **I**)... Ma (**XI, XII**)... OΣ (**IX**) ... *Gr. Obsns.* 1840 ... Ra (**XXIII**) ... Du...Kn...*Δ* (1194)...*Δ* (**I, II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)... Do (2199) ... Je (2369) ... Engelhardt (**II**)... En (2677) ... Glasenapp (**III**) .. *Annals Toulouse Obsy.* **III**...]

9 7 **8442.** **A 38.** No other measures.

[A (3635)(*Bul. L. O.* No. 11)...]

9 13 **8443.** **β 284.** These faint companions were noted with the 18½-inch. Glasenapp measures from A three more distant stars:

1890.51	192°1	57″32	2*n*	...8.8
1890.51	179.6	76.01	2*n*	...8.9
1890.51	268.5	138.87	2*n*	...9.6

Cogshall measures a 13.5 m star from A, 102°9:17″53 (1898.67) 1*n*.

A and B

1890.51	358°2	19″22	2*n*	Gla	7.3...10.5
1898.67	359.3	17.84	3*n*	Cg	7.3...11.0

A and C

1898.67	86°6	29″75	3*n*	Cg	...10.8

A and *a*

1898.67	199°6	11″83	3*n*	Cg	...11.5

A and *b*

1898.67	66°1	21″63	3*n*	Cg	...10.8

B and *c*

1898.67	327°2	5″03	3*n*	Cg	...11.5

[β (**V**)... β (*Mon. Not.* **XXXV**, 31) ... β (3114)(*Pub. L. O.* **II**) ... Glasenapp (**I**) ...Cogshall (*A. J.* 478)...]

8444. **H 2828.** Probably fixed. 9^m 18^s

1873.67	110°7	16″22	1*n*	*Δ*	9.0...9.2
1893.55	110.8	16.53	1*n*	Big	

[*Δ* (**I**)...Big...Big (*Bul. Ast.* **XII**, 299)...]

8445. **H 1316.** Nothing since H but the following: 9 19

1904.66	251°2	14″20	1*n*	Cogshall

8447. **Σ 2296.** Unchanged. 9 24

1867.15	8°1	2″94	4*n*	*Δ*
1904.77	5.2	2.95	1*n*	Cogshall

[Ma (*F. S.* **I**)...Mh...Se...*Δ* (**II**)...T (3185)...]

8448. **β 285.** Quadruple. Discovered with the 18½-inch. C is O. Arg. N. 17954. No sensible change. 9 26

A and B

1877.59	316°4	1″47	1*n*	Cin
1893.55	319.1	1.57	1*n*	Lv
1893.70	316.1	1.61	1*n*	Wilson
1898.68	318.3	1.51	1*n*	Boothroyd
1898.75	318.6	1.63	3*n*	Doo

C and D

1893.70	16°9	2″24	1*n*	Wilson
1898.68	18.8	2.32	1*n*	Boothroyd
1898.75	18.0	1.99	3*n*	Doo

A and C

1890.50	140°8	60″41	2*n*	Gla
1898.68	140.5	59.76	2*n*	Boothroyd
1898.75	141.1	60.15	3*n*	Doo

[β (**V**) ... β (*Mon. Not.* **XXXV**, 31) ... β^3 ... Cin^4 ... Cin^6 ... Lv (*A. J.* 382) ... Wilson (   )... See (3496) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Boothroyd (*A. J.* 478)...Glasenapp (**I**)...]

8449. *η Sagittarii.* **β 760.** Discovered with the 6-inch at Mt. Hamilton in 1879. There is probably no material change in the close star. The bright star has a proper motion of 0″126 in the direction of 288°4, according to the *Second* 9 30

Washington Catalogue, and B appears to be moving with it. The faint star, C, was noted by Aitken with the 36-inch. The proper motion of A substantially accounts for the change in the position of the distant star, D.

A and B

1886.71	99°.5	4″.36	1*n*	Pollock
1895.72	99.2	3.60	3*n*	Sellors
1896.46	101.2	3.65	2*n*	A
1897.38	105.3	3.87	2*n*	See

A and D

1879.66	302°.2	94″.38	2*n*	β
1896.47	303.8	93.14	3*n*	A

[β (**XI**)....β^2....β (2957)(*Pub. L. O.* **II**)....Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* **XLVII**, 473)(*Mem. R. A. S.* **L**)....A (3396)....Sellors (3369).... See (3496)...]

9^m 59^s **8453. H 2827.** "A very remarkable object; a double star in a pretty large, bright, oval nebula, 50″ in diameter." Unchanged.

1879.46	253°.0	19″.82	3*n*	β	10 ...10
1903.48	253.0	19.88	2*n*	β	9.8... 9.9

[β^1...β^3...Cin^5...β^6...]

10 14 **8454. OΣ 346.** Without change.

1867.06	328°.2	5″.42	4*n*	Δ
1898.40	328.7	5.59	3*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX**)... Da^3... Se... Se^2... En (1674)... Du... Ba (**I**)... Δ (**I**)...T (2991)...Per...Per (2685)...Knorre (3518)...Hu (*Pub. L. O.* **V**)... Coleman (*Mem. R. A. S.* **LIV**)...]

0 17 **8455. OΣ (App) 167.** Error of 2^m R. A. in OΣ. B is DM (4°) 3677. No motion.

1905.52	78°.5	53″.63	2*n*	β

[Δ (**I**)...β^6...]

10 34 **8456. β 246.** This difficult pair was discovered with the 6-inch. There is no evidence of relative motion. The magnitude in Gould is 7½.

1881.59	110°.0	0″.47	3*n*	β
1881.61	117.3	0.47	3*n*	Sp
1891.63	105.6	0.51	2*n*	β
1898.67	107.9	0.51	1*n*	Cogshall
1901.58	110.6	0.51	3*n*	Doo

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....β^3....β^4....β (3114)(*Pub. L. O.* **II**).... Δ (**I**)....Cin^4....Cin^5....Sp (**II**)....Cogshall (*A. J.* 478)....Doolittle (*Pub. Flower Obsy.* **II**)....]

10 37 **8457. H 2829.** "Triple; pos. est. from diagram." Examined, and principal star not more than 9 m (1876). The only measures are:

AB	1903.57	322°.3	5″.25	2*n*	β	9.5...12.0
AC	1903.57	165.2	6.32	2*n*	β	...12.5

[Glasenapp (**II**)...β^6...]

10^m 44^s **8458. β 463.** (= **Hn 143.**) Discovered with the 6-inch. No motion. The other measures are:

1896.50	101°.3	2″.22	3*n*	Lv	9.0... 9.8
1903.06	104.7	1.88	4*n*	Doo	
1904.88	104.9	1.71	3*n*	Doo	9.2...10.0

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Com (**VI**)...Lv (*A. J.* 407)...Glasenapp (**II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10 48 **8459. β 299.** (AB = **Sh 263.**) The faint stars near this wide pair of South and Herschel were noted with the Washington 26-inch. The other measures are:

e and *d*

1899.55	124°.1	8″.27	1*n*	β

A and B (= Sh 263)

1879.46	11°.5	54″.32	1*n*	Cin	7.0...8.5
1891.64	12.4	53.69	2*n*	β	6.9...7.7
1899.55	12.6	54.16	1*n*	β	

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... Cin^5...]

10 48 **8460. Σ 2301.** The distance is less in the later measures.

1867.54	123°.4	22″.28	4*n*	Δ
1897.55	123.7	21.88	2*n*	Gla
1905.56	124.3	21.98	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^5...Glasenapp (**V**)...β^6...]

10 53 **8461. H 857.** The only measure is this:

1901.48	20°.0	21″.20	2*n*	β^5	8.0...11.0

10 55 **8462. Howe 42.** From Cin^5.

1904.67	195°.7	19″.91	2*n*	Miller

11 ± **8463. H. C. Wilson 16.** From Wilson (Cin^{10}) with rough place. This may be H 2826 (No. 8452).

1904.77	260°.4	10″.39	1*n*	Miller	9.5...9.6

11 11 **8464. Ho 269.** No motion. Not in DM, but 51^s *f* the 8 m star, DM (20°) 3712.

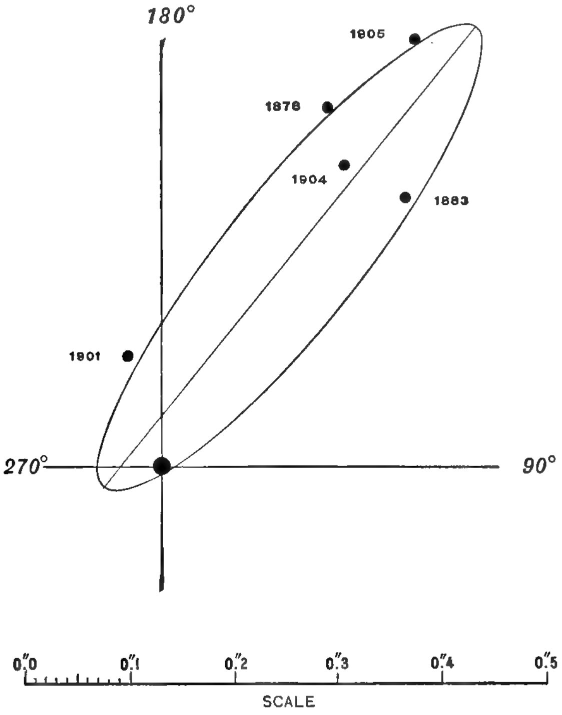
1904.42	161°.5	6″.61	4*n*	Doo

[Ho (2977, 3558)...]

11 40 **8467. β 639.** (CD = **β 300**; AC = **Sh 264.**) The faint star, D, was detected with the Washington 26-inch in 1874, and subsequently the principal star of the wide pair was found to be a close pair with the 18½-inch. If the distance in 1874 had not been less than at the time of discovery in 1878, it could hardly have been missed with the larger instrument.

It is evidently in rapid motion. It was an easy pair in 1878, and entirely beyond the reach of the 36-inch under fine conditions in 1892.

The measures in 1878 are very discordant. It was noted at the time in the first observation, "distance certainly too large." The second and smaller distance is given on the diagram, with a mean of the position-angles. The ellipse shown is not given as an orbit, but to show the probable distribution of the measures as to quadrants. It is very probable that at least one revolution has been completed since discovery. The rapid increase in distance from 1901 to 1905 is suggestive of a much shorter period.



β 639

All the measures of the close pair are given:

A and B

1878.62	147°0	0″76	1*n*	β
1878.70	163.6	0.38	1*n*	β
1883.12	137.9	0.35	2*n*	Sp
1891.65	Single 12-in.			β
1892.36	Single 36-in.			β
1898.50	Elongated in 355°?		2*n*	Doo
1898.58	Uncertain		1*n*	A
1899.49	Less than 0″1		2*n*	A
1901.52	197.5	0.11	2*n*	A
1904.66	148.8	0.34	3*n*	A
1905.55	149.4	0.48	2*n*	A

C and D (= β 300)

1898.50	322°4	7″55	2*n*	Doo
1899.20	323.3	8.07	3*n*	A
1901.59	321.9	7.78	1*n*	Doo

There is no change in the wide stars.

AB and C (= Sh 264)

1877.60	52°2	17″37	2*n*	Cin	7.2...8.0
1878.66	51.7	17.30	2*n*	β	...8.0
1883.29	51.3	17.15	3*n*	Sp	...8.0
1890.50	51.2	16.67	2*n*	Gla	7.2...7.7
1891.65	52.4	17.21	2*n*	β	7.1...7.7
1898.49	52.0	17.31	3*n*	Doo	6.9...7.7
1899.03	52.0	17.27	2*n*	A	6.9...7.0

[β (**V**, **X**)....β (*Mon. Not.* **XXXV**, 31)...β^{1}...β (3114, 3142)(*Pub. L. O.* **II**)(*A. J.* 271)....Sp (**II**)....Hl (*Wash. Obsns.* 1862)....Cin^{4}....Cin^{6}....Glasenapp (**I**) (*A. J.* 241)...Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 250)(*Mon. Not.* **LXIV**, 52)... A (3639)(*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **I**, **II**)...]

8468. **OΣ 349.** Probably some change in the angle. There are all the measures: 11m 53s

1843.33	91°5	0″40	2*n*	Ma
1846.72	95.3	0.62	3*n*	OΣ
1870.17	103.6	Obl.	7*n*	Δ
1884.24	98.3	0.39	8*n*	En
1889.66	93.2	Obl.	3*n*	T
1898.68	107.9	0.29	3*n*	Hu

[OΣ (**IX**)...Ma (**XI**)..Δ (**I**)...Flm...En (2678)...T (3186)...Hu (*Pub. L. O.* **V**)...]

8469. **Σ 2307.** Fixed. 12 8

1866.74	204°7	4″16	3*n*	Δ
1894.55	204.5	4.23	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**III**)...]

8470. **A 240.** No other measures. 12 8

[A (3784)(*Bul. L. O.* No. 16)...]

8471. **H 1317.** Bigourdan measures three pairs in or near this place, magnitudes not given, and Miller still another. These measures are: 12 10

1893.57	132°3	9″98	1*n*	Big	
1893.57	153.5	10.78	1*n*	Big	
1893.57	346.7	11.69	1*n*	Big	
1904.69	122.2	18.29	3*n*	Miller	10...12

The first is evidently H 1317.

[Big (*Bul. Ast.* **XII**, 299)...]

8476. **β 1274.** The wide double companion BD was noted with the 18½-inch in 1878, and the brighter of the two found to be a close pair with the 36-inch in 1892. 12 35

A and B

1878.85	239°5	96″08	2*n*	β
1898.62	239.4	96.10	3*n*	A

B and C

1898.63	146°2	1″16	4*n*	A	10.7...11.6

B and D

1878.85	5°0	5″63	2*n*	β
1898.63	8.2	5.01	4*n*	A

[β (**XIX**)....β (3141)(*Pub. L. O.* **II**)....β^{1}....β^{3}....A (3585)....Lewis (*Mon. Not.* **LX**, 509)...]

(See p. 1079)

$12^m 42^s$ **8477.** **H 2831.** Nothing later but the following:

1904.64	342°.6	13″.60	2*n*	Cogshall

13 13 **8479.** **Σ 2304.** Unchanged.

1866.95	71°.2	5″.03	4*n*	Δ
1895.51	68.5	5.16	2*n*	Gla

[Ma (*F. S.* I)...Ma (XI)...Hl...Wr...Se...Δ (II)...Glasenapp (IV)...]

13 19 **8480.** δ *Sagittarii.* **See 350.** Distant companions noted by Cogshall (*A. J.* 431).

13 20 **8481.** **H 5494.** The only measures are:

1901.48	69°.8	39″.49	3*n*	β^5	6.0...11.8

13 24 **8482.** **Σ 2305.** Unchanged.

1866.53	335°.1	4″.92	3*n*	Δ
1905.70	334.0	5.10	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...Se...Bl (V)...Δ (II)...β^6...]

13 24 **8483.** **Schj 16.** From list of new pairs by Schjellerup. Angle increasing? The following are all the other measures:

1875.68	195°.5	2″.56	4*n*	Sp
1879.08	194.2	2.34	3*n*	Cin
1888.48	196.2	2.33	3*n*	Lv
1890.56	199.4	2.97	2*n*	Gla
1900.53	198.1	2.69	3*n*	Doo

[Schj (1485)...Δ (I)...Sp (2133)...Sp (II)...Lv^1...Cin^5...Glasenapp (I)... Doolittle (*Pub. Flower Obsy.* I)...]

13 27 **8484.** **A. G. 218.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

13 34 **8485.** **Σ 2303.** The angle in Σ appears to be too small, as the later measures show no motion.

1851.76	223°.3	3″.49	2*n*	Ma
1867.85	223.7	3.00	4*n*	Δ
1879.66	221.9	2.64	3*n*	Sp
1887.60	223.3	2.91	3*n*	Hl
1895.71	224.0	2.64	2*n*	Collins

[Ma (*F. S.* I)...Ma (XI, XIII, XV)...Mh...H (VII)...Wr...Hd...Flm... Δ (1116, 2195)...Δ (I, II)...Se...Giacomelli (III)...Pt...Cin^4...Cin^5... Lv^1...LM...Sp (II)...Hl (II)...Glasenapp (I)...Collins (*A. J.* 378)...Pt (*A. J.* 397)...Brown (3646)...Boeger (*A. J.* 522)...]

13 38 **8486.** **A. G. 219.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

$13^m 55^s$ **8488.** **β 48.** Discovered with the 6-inch. No change.

1879.08	359°.7	2″.43	2*n*	Cin
1886.30	358.8	2.51	1*n*	LM
1892.56	360.2	2.17	1*n*	Lv
1898.72	362.5	2.26	3*n*	Boothroyd

[β^1...β (*Mon. Not.* XXXIII, 351)...Δ (I)...Cin^4...Cin^6...LM...Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)...Boothroyd (*A. J.* 478)...]

14 1 **8489.** **Hu 197.** A later measure:

1902.65	32°.7	0″.37	1*n*	Bowyer

[Hu (*A. J.* 485)...Bowyer (*Mon. Not.* LXIII, 403)...]

14 14 **8490.** **Perrine.** Discovered by Perrine at the Lick Observatory.

1902.65	1°.3	3″.60	3*n*	Hu

[Perrine (*Pub. A. S. P.* XII, 129)...Hu (*Bul. L. O.* No. 44)...]

14 21 **8492.** **A. G. 220.** Both stars in *A. G. Harvard.* Measures by Espin (3717).

14 30 **8494.** **A 242.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

14 53 **8496.** 74 *Ophiuchi.* **H 5495.** The large star has a proper motion of 0″.019 in 264°.1 (Auwers). The following are all the measures:

1878.51	285°.6	27″.96	1*n*	β^1	
1903.40	286.4	28.20	3*n*	β^6	...11.6

14 56 **8497.** **A. G. 221.** Double in *A. G. Berlin.*

1903.73	11°.3	1″.29	2*n*	Biesbroeck

[Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...Biesbroeck...]

15 6 **8498.** η *Serpentis.* **Σ 8, App. I.** (= **H̶ VI. 14.**) The change in the position of the smaller star is due to the proper motion of A, which is given:

Auwers	0″.904 in 220°.6
Bossert	0.906 in 221.4

1781.80	99°.1	81″.33	1*n*	H̶
1836.46	77.2	112.70	3*n*	Σ
1867.70	69.5	135.15	5*n*	Δ
1868.55	69.6	135.78	1*n*	OΣ
1879.37	67.3	143.66	2*n*	β
1882.55	66.8	146.88	1*n*	OΣ
1886.68	66.2	149.88	2*n*	Hl
1904.40	63.5	163.57	2*n*	β
1905.20	63.4	164.33	2*n*	β

The measures of Σ and β give 0″.888 in 217°.2 for the proper motion of A.

[Δ (1736)...Δ (II)...OΣ (X)...Pk...Hl (*Wash. Obsns.* 1886)...Hl (II)...β^3... Flm...β^6...]

15^m 13^s **8500.** **H** 1319. Fixed. These are all the measures:

1873.41	193°.4	17″.00	1*n*	Δ	8.7...11.5
1904.66	192.9	16.32	3*n*	Miller	9 ...11
1905.62	194.8	17.52	1*n*	β	8.5...10.8

[Δ (I)...β^6...]

15 14 **8501.** **Σ** 2309. (= **H** I. 86 = **Sh** 265.) Fixed.

1868.38	351°.7	3″.58	4*n*	Δ
1877.64	352.5	3.79	3*n*	Sp
1894.55	350.9	3.66	2*n*	Gla

[Ma (*F. S.* I)...Ma (**X, XI**)...Bp...Da^3...Wr...Se...Se^2...Hd...Ba (**II**)...WS^2....Δ (**II**)....Sp (**II**)....Glasenapp (**III**)....Bowyer (*Mon. Not.* **LXIV**, 802)....]

15 22 **8502.** Δ 18. (AB = **Σ** 2306 = **Sh** 266.) The duplicity of the Σ companion was discovered by Dembowski in 1864, but there is an earlier measure in the more recently published observations of Mitchel (Cin^2). There appears to be no sensible change in the close pair since 1848, and no change in the principal star since 1831.

B and C

1848.62	63°.8	0″.56	1*n*	Mh
1865.18	64.3	0.82	6*n*	Δ
1877.66	60.7	1.09	1*n*	Sp
1878.68	62.3	1.04	1*n*	Δ
1886.62	67.9	0.90	4*n*	Hl
1898.65	65.3	1.02	2*n*	Hu

A and BC

1865.08	220°.0	12″.30	4*n*	Δ
1880.67	219.8	12.05	4*n*	Sp
1886.62	220.6	12.14	4*n*	Hl
1898.65	221.6	12.07	2*n*	Hu

[H^3....Ra (**XXIII**)....Δ (1194, 1573)....Δ (**I, II**).....Mh....Ma (*F. S.* **I**)....Hl *Wash. Obsns.* 1862, 1884)...Hl (**II**)...Flm...Pt...Cin^4...Cin^5...Lv^1...Sp (**II**)...Glasenapp (**I, III**)...Pt (*A. J.* 397)...*Annals Toulouse Obsy.* **III** ...Jouffray (*Bul. Ast.* **XXI**, 299)...]

15 37 **8504.** **Σ** 2310. Probably unchanged.

1866.06	237°.2	4″.98	3*n*	Δ
1886.69	235.9	5.21	3*n*	Hl
1903.50	238.6	5.15	2*n*	Do

[Ma (*F. S.* I)...Ma (**XI, XII, XIII**)...H (**V**)...Se...Flm...WS...WS^2...Gl...Δ (**II**)....Sp (**II**)....Hl (*Wash. Obsns.* 1886)....Hl (**II**)....HΣ (**XII**)....Do (3931)...Bowyer (*Mon. Not.* **LXIV**, 802)...]

15 55 **8505.** **β** 1252. Discovered with the 18½-inch in 1875, but inadvertently omitted from the published catalogues of that time. There seems to have been no change.

1891.46	182°.7	1″.23	3*n*	β
1898.49	181.3	1.29	3*n*	Doo
1899.66	183.1	1.30	2*n*	Hu
1905.50	178.7	1.43	3*n*	Doo

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...Δ (**I**, p. 347)...Doolittle (*Pub. Flower Obsy.* **I**)...Hu (*Bul. L. O.* No. 44)...]

16^m :^{s} **8506.** **O. Stone** 42. From Cin^6, with rough place. In 1901 I could not find any pair of this description in or near this place.

[Cin^6...β^5...]

16 3 **8507.** **β** 640. *Herculis* 443. Lalande 33880. Discovered with the 18½-inch. The following are all the later measures:

1884.91	340°.6	2″.49	3*n*	HΣ
1892.38	341.1	2.20	1*n*	β
1893.66	338.4	2.38	1*n*	Ho
1901.73	333.5	2.30	4*n*	A
1904.47	338.1	2.54	8*n*	Doo

[β (**X**)...β^1...β^3...β (3142) (*Pub. L. O.* **II**)...Ho (3234)...HΣ (**XII**)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

16 6 **8508.** **Ho** 566. This star is given a proper motion of 0″.137 in 360° (Paris).

1897.63	140°.5	0″.51	1*n*	See	7.5...8.1

[Ho (3557) (*A. J.* 215)...See (3496)...]

16 26 **8510.** **Σ** 2312. Fixed.

1868.38	339°.3	1″.53	4*n*	Δ
1883.60	339.8	1.66	4*n*	Per
1903.65	336.2	1.47	2*n*	Gr. Obsy.

[Ma (*F. S.* **I**)...Ma (**X**)...Se...OΣ (**IX**)...Δ (**II**)...UL...Per...Per (2559)...Glasenapp (**IV**)...Brown (3646)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 802)...]

16 28 **8511.** **Ho** 430. No change.

1903.48	194°.2	2″.48	3*n*	β	9.2...10.3
1904.42	193.8	2.37	3*n*	Doo	

[Ho (3234, 3558)...Bowyer (*Gr. Obsns.* 1899)...Lewis (*Mon. Not.* **LXIII**, 403)...β^6...]

16 38 **8512.** **Σ** 2311. Rectilinear motion. The measures of Σ and β (1830–1900) give 0″.047 in 191°.2 for the proper motion of A. There are evidently large discrepancies in some of the distances.

1830.30	170°.7	8″.65	4*n*	Σ
1850.71	165.9	8.43	1*n*	Ma
1867.77	164.9	6.69	4*n*	Δ
1881.64	164.2	6.78	3*n*	Sp
1887.65	159.8	6.11	2*n*	HΣ
1895.71	159.8	6.08	2*n*	Collins
1896.48	158.8	6.00	3*n*	Lv
1896.61	159.5	5.43	2*n*	Pt
1897.57	159.5	5.95	2*n*	Gla
1900.51	159.0	5.68	2*n*	β

[H (**IV**)...Ma (*F. S.* I)...Ma (**XI, XIII**)...Flm...Δ (1800)...Δ (**II**)...Sp (**II**)...Collins (*A. J.* 378)...Pt (*A. J.* 397)...Lv (*A. J.* 407)...Glasenapp (**V**)...HΣ (**XII**)...β^5...]

16 40 **8513.** **A** 243. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

$16^m\ 42^s$ **8514.** **β 641.** Discovered with the 18½-inch. The following are some of the later measures:

1878.68	356°.4	1″.07	1*n*	Δ
1884.22	347.4	1.01	3*n*	HΣ
1886.29	345.0	1.10	8*n*	En
1890.45	345.9	1.01	3*n*	β
1890.71	357.1	1.02	2*n*	Maw
1891.01	351.6	0.87	4*n*	Sp
1896.92	347.5	0.96	6*n*	Lewis
1897.70	342.3	0.97	3*n*	A
1900.56	342.9	0.90	7*n*	Bowyer
1902.97	345.0	0.82	6*n*	Lewis
1903.82	345.3	1.14	9*n*	Doo

[β (**X**)...β^1...β^3...β (3048)(*Pub. L. O.* **II**)... Δ (I) ... En (2786) ... Sp (**III**)... Maw (I)... Sk^4... Sk^5... A (*A. J.* 429)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)... Biesbroeck ... HΣ (**XII**)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

16 44 **8516.** **A. G. 222.** Double in *A. G. Leipzig*, and noted independently by Perrine at Mt. Hamilton, whose measures are given. A 13 m star, 51°.4 : 14″.9.

1902.64	144°.5	1″.79	3*n*	Hu
1904.44	145.3	1.48	3*n*	Miller

[Perrine (*Pub. A. S. P.* **XII**, 129)...Hu (*Bul. L. O.* No. 44)...]

16 59 **8517.** **Σ 2326.** Without change.

1866.57	199°.6	15″.71	3*n*	Δ
1899.75	198.2	15.85	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**X**)...Δ (**I**, p. 409, **II**)...Hl (**I**)... En (2662)... de Ball (3017)...Glasenapp (**V**)...Cin^5...]

17 : **8518.** **Lewis 20.** Discovered by Lewis. It should be very near Ho 430. In measuring that in 1903, I failed to find this pair. (See No. 8511.) There is no star here as bright as 7.5 m.

[Lewis (*Mon. Not.* **LXIII**, 412)...]

17 3 **8520.** **β 49.** Discovered with the 6-inch. Probably fixed.

1892.55	46°.0	8″.39	3*n*	Lv
1897.70	45.5	8.31	2*n*	See
1898.47	46.5	8.10	3*n*	A
1900.03	45.0	8.17	6*n*	Doo

Aitken measures from A two more distant stars:

AC	1898.47	301°.3	21″.73	1*n*	A	...12.5
AD	1898.47	148.3	24.20	1*n*	A	...12.0
	1901.57	147.9	24.06	2*n*	Doo	...11.7

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351) ... Δ (**I**) ... Cin^4... Cin^6... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892) ... See (3496)... Doolittle (*Pub. Flower Obsy.* **I, II**)...A (3585)...]

17 20 **8521.** **H 1320.** No motion.

1873.41	150°.9	18″.98	1*n*	Δ	9.7...10.0
1904.64	151.3	17.91	2*n*	Cg	
1905.62	152.9	19.00	1*n*	β	9.6... 9.5

[Δ (**I**)...Big...β^6...]

8522. **H 1321.** The only measures are: $17^m\ 22^s$

1900.59	86°.2	9″.56	3*n*	Espin (3717)

8526. **See 352.** Other measures are: 17 55

1899.59	72°.0	3″.03	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8527. **H 858.** The only measure is: 17 58

1904.44	228°.9	12″.77	1*n*	β^6	8.5...9.5

8528. **Cordoba.** "Double, Cl. II" in *Cordoba Zones.* 18 6

1903.64	358°.1	5″.52	2*n*	Scott

[See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...]

8529. 21 *Sagittarii.* **A. Clark 10.** Discovered by Alvan Clark, but it had been previously seen and measured by Jacob in 1846. No evidence of change. The large star has a proper motion of 0″.027 in 261°.5 (Auwers). 18 12

1873.31	292°.6	2″.11	5*n*	Δ
1878.68	294.0	1.95	5*n*	Sp
1900.53	292.4	1.82	3*n*	A

[WJ...J^2...Da^3...Da (*Mon. Not.* **XVII**, 257)...Δ (**I**)...Cin^4...Cin^5...Cin^6... Sp (**II**) .... Pk .... Collins (*Proc. Haverford Coll. Obsy.* 1891).... T (3186) .... See (3496).... Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52).... A (*Bul. L. O.* No. 11)....]

8530. **Σ 2313.** (= **S** 701.) Fixed. 18 16

1867.91	199°.3	6″.10	4*n*	Δ
1895.59	198.7	6.07	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)... Mh... J^3... Ferguson (*Wash. Obsns.* 1863)...Se... WS^2...Δ (**II**)...Glasenapp (**I, III, IV**)...*Annals Toulouse Obsy.* **III**...]

8531. **Σ 2314.** Fixed. 18 26

1868.39	328°.2	2″.39	4*n*	Δ
1903.67	322.8	2.22	1*n*	Lewis
1904.77	328.1	2.42	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Lewis (*Mon. Not.* **LXIV**, 803)...]

8533. **Hn 144.** Discovered at the Washburn Observatory. 18 29

1900.56	41°.3	2″.71	1*n*	Hu

[Hn (*Pub. Washburn Obsy.* **II**)....Com (**VI**)....See (3496)....Hu (*Bul. L. O.* No. 44)...]

8534. **Ho 83.** The other measures are: 18 34

1896.64	84°.3	0″.37	2*n*	Ho
1904.53	82.5	0.45	3*n*	Doo

[Ho (2778, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

$18^m\ 44^s$ **8535.** A. Clark 11. Discovered by Alvan Clark, July, 1854. The later measures are not very accordant, but there is no evidence of change.

1874.23	173°3	0″35±	5*n*	Δ
1875.65	172.0	0.33±	5*n*	Sp
1887.59	178.7	0.28	1*n*	Hl

[Da (*Mon. Not.* **XVII**, 257)...Da^3...Se^2...Flm.... Δ (**I**)... Cin^5...Pt...Big... Sp (2133)...Sp (**II**)...Hl (**II**)...T (3186)...]

(See p. 1080)

19 1 **8537.** OΣ 347. Probably fixed. All the other measures are given.

1843.55	353°5	3″69	2*n*	Ma
1868.10	347.9	3.11	4*n*	Δ
1887.67	347.5	3.08	1*n*	HΣ
1896.52	346.5	3.13	3*n*	Lv
1898.56	346.5	3.12	3*n*	Hu
1901.59	345.0	3.21	3*n*	Doo
1903.50	348.7	2.88	2*n*	Do

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Lv (*A. J.* 407)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**) ...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

19 23 **8538.** β 1325. Noted with the 40-inch. It is 27^s *f*, and 26″ *n* of a 6.7 m star. No other measures.

[β^6...]

19 27 **8540.** A 244. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

19 41 **8541.** Ho 431. Fixed.

1904.48	359°9	21″30	3*n*	Doo

[Ho (3234)...]

19 56 **8542.** Ho 432. Fixed.

1904.53	287°0	16″77	3*n*	Doo

[Ho (3234)...]

19 57 **8543.** β 1203. Discovered with the 36-inch. Lalande 34015. The motion, if any, is very slow. These are all the measures:

1890.67	67°8	0″30	3*n*	β
1892.40	66.8	0.32	1*n*	β
1893.77	48.0	0.25±	1*n*	Sp
1896.74	72.6	0.43	1*n*	Lewis
1899.46	72.0	0.31	3*n*	A
1900.67	90.2	0.20	1*n*	Lewis
1900.98	74.1	0.38	4*n*	Doo
1901.12	68.3	0.23	5*n*	Bryant

[β (**XVII**)...β (3047, 3142) (*Pub. L. O.* **II**)... Sp (**III**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403)... Doolittle (*Pub. Flower Obsy.* **I, II**)...A (3639)...]

20 2 **8544.** β 965. Discovered with the 18½-inch. Relatively fixed.

1898.60	105°3	1″60	3*n*	A
1898.63	106.4	1.44	3*n*	Doo

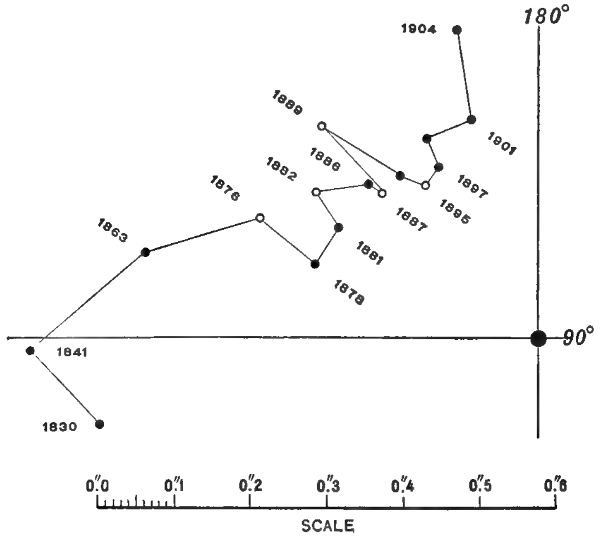
[β (**XIII**)...β^3...A (3585)...Doolittle (*Pub. Flower Obsy.* **I**)...]

8545. Ho 84. Not in DM. It is 117″60 from Σ 2315 in the angle of 290°7 (1903.48). The distances are very discordant, and the apparent change may not be real. The Greenwich distances vary from 3″50 to 4″87. These are all the measures: $20^m\ 3^s$

1885.70	312°9	2″02	1*n*	Ho
1895.72	319.8	2.81	1*n*	Ho
1896.75	316.3	3.59	1*n*	Ho
1899.17	319.2	4.31	8*n*	Lewis
1903.48	320.1	4.10	3*n*	β
1904.49	320.0	3.69	3*n*	Doo

[Ho (2778, 3558)...Lewis (*Mon. Not.* **LVI**, 359; **LIX**, 418; **LXII**, 395; **LXIII**, 412) ...β^6...]

8548. Σ 2315. *Herculis* 452. A decided change in the relation of the components, and perhaps a physical system, but so far the motion is practically rectilinear. The measures in distance are somewhat discordant. There is a faint companion, 79°9 : 21″7 (1898.34). 20 12



Σ 2315

1830.74	281°1	0″59	4*n*	Σ
1841.12	271.4	0.68	4*n*	OΣ
1863.73	257.6	0.53	3*n*	OΣ
1876.59	246.5	0.4±	9*n*	Sp
1878.45	251.7	0.31	1*n*	β
1881.46	241.0	0.30	2*n*	β
1882.89	236.5	0.35±	10*n*	Sp
1886.63	227.7	0.30	4*n*	Hl
1887.13	227.4	0.28±	9*n*	Sp
1889.55	225.4	0.4±	5*n*	HΣ
1892.39	220.5	0.28	3*n*	β
1895.80	216.4	0.25±	3*n*	Com
1897.59	209.9	0.26	2*n*	A
1897.92	209.0	0.30	6*n*	Lewis
1901.70	197.0	0.30	8*n*	Lewis
1904.50	194.6	0.42	3*n*	Doo

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XIII, XV**) ... Se (*Comp. Rend.* **XLVIII**, 375)... Se... Se^2... Hd... Flm... Do (2307)... OΣ (**IX**)... Δ (1736)... Δ (**II**)... En (1674, 2677, 2786)...Sp (2133)...Sp (**II, II** App.)...Newcomb (*Wash. Obsns.* 1874)....Hl (**II**).... Hl (*Wash. Obsns.* 1884).... Per....Per (2559, 2685)....

Glasenapp (**II, III**) . . . β^1 . . . β^4 . . . β (*Pub. L. O.* **II**) . . . β (3142) . . . Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803) . . . Com (**X**) . . . A (3466) . . . HΣ (**XII**) . . . Do (3931) . . . Biesbroeck . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

$20^m\ 15^s$ **8549.** **β 133.** Discovered with the 6-inch. Very little, if any, change. The *p* star of a small equilateral triangle of 7 m stars, about 1° 20′ *s* of λ *Sagittarii.* Gould gives this 6.8 m.

1878.97	263°0	1″72	3*n*	Cin	6.7 . . . 6.7
1888.52	264.7	1.80	2*n*	Lv	5.8 . . . 6.2
1890.49	267.5	2.07	2*n*	Gla	7.0 . . . 7.1
1892.64	264.4	1.79	2*n*	T	7.5 . . . 7.5
1895.46	260.5	2.10	2*n*	Barnard	
1897.50	259.3	1.75	3*n*	Scott	7½ . . . 7½
1905.50	259.2	2.03	3*n*	Doo	7.3 . . . 7.4

[β (**III**) . . . β (*Mon. Not.* **XXXIV**, 59) . . . Sp (**II**) . . . Sp (2133) . . . Cin^3 . . . Cin^4 . . . Cin^5 . . . Lv^1 . . . Glasenapp (**I**) . . . T (3186) . . . Sellors (3240) . . . Barnard (*A. J.* 447) . . . See (3496) . . . Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52) . . . Solá (3679) . . . Do (3799) . . .]

20 30 **8550.** **Σ 2317** *rej.* (ABD = **Σ** 2317 *rej.*) In measuring the Struve companions, the nearest was found to be a close pair. No other measures of the distant stars. No. 8556 may be identical with BC, although from the measures they would appear to be different objects.

[β^6 . . .]

20 37 **8551.** **Σ 2318.** The distance is 12″85 in *Mens. Micr.* It was evident from the later measures that this was erroneous, and many years ago, at my suggestion, OΣ examined the original observations and found that the distance should be 20″51. There has been no change.

1865.35	255°4	20″61	5*n*	Δ
1888.76	254.6	20.71	3*n*	HΣ
1902.74	253.5	20.82	2*n*	Do
1903.38	253.6	20.83	3*n*	β
1903.83	253.9	20.75	3*n*	Doo

The measures by Lewis in 1903 belong to some other pair. There is a pair of faint stars in the field directly *f*, 265° : 2″.

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Hd . . . Δ (1573) . . . Δ (**II**) . . . Big . . . Hl (**II**) . . . Flm . . . Hl (*Wash. Obsns.* 1886) . . . Sp (**II**) . . . β^1 . . . β (2210) . . . β (*Ast. Reg.* **XVIII**, 113) . . . Lewis and Bowyer (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403) . . . HΣ (**XII**) . . . Do (3931) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . β^6 . . .]

20 37 **8552.** **Ho 85.** Unchanged.

1904.50	194°7	4″52	4*n*	Doo

[Ho (2778, 3234) . . .]

20 40 **8553.** **H 5496.** "Suspected double with 180." I could not see any companion with the 6-inch in 1876, nor with the 40-inch in 1901. It is safe to say that this star is not double.

21 : **8556.** **Lewis 23.** From *Mon. Not.* LXII, 395. This may be the same as BC of Σ 2317 *rej.* (No. 8550.)

8557. **Schj 17.** From list of new pairs by Schjellerup (*A. N.* 1485). Measures by β^6. $20^m\ 43^s$

8560. **Espin —.** The principal star has a proper motion of 0″103 in 360° (*A. G. Harvard*). 20 57

1905.66	201°3	2″40	2*n*	β

[Espin (*Eng. Mech.* **LXXVIII**, 178) (*Mon. Not.* **LXIV**, 238) . . . β^6 . . .]

8561. **OΣ 350.** Without change. Given as new in Ma (XI). 21 2

1867.36	166°0	1″74	4*n*	Δ
1898.53	168.2	1.76	4*n*	Hu

[Ma (**XI**, pp. 61, 74) . . . Se . . . OΣ (**IX**) . . . Δ (**I**) . . . Per . . . Brown (3646) . . . Glasenapp (**V**) . . . Hu (*Pub. L. O.* **V**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

8562. 59 *Serpentis.* **Σ 2316.** (= **H I. 12** = **Sh 268.**) Fixed. The large star has a proper motion of 0″027 in 265°8 (Auwers). 21 4

1866.25	315°6	3″80	3*n*	Δ
1875.69	316.5	3.77	5*n*	Sp
1890.54	316.4	3.89	8*n*	Giacomelli
1904.30	317.6	3.72	3*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI, XIII**) . . . Ma (304, 324) . . . Mh . . . Ba (**II, III**) . . . H^1 . . . WJ . . . WJ^2 . . . Se . . . Wr . . . J^2 . . . H (**VII**) . . . Bp . . . Da^1 . . . Da^3 . . . Ra (**XXI**) . . . Δ (1032) . . . . Δ (**I. II**) . . . . Δ (*Mem. Accad. Sci.*) . . . . Hl (*Wash. Obsns.* 1863) . . . Hl (**I**, p. 134) . . . WS . . . Gl . . . Sk^2 . . . Ferr . . . Du . . . Pk . . . Per . . . Per (2529) . . . Sp (**II**) . . . Giacomelli (**III**) . . . T (3185) . . . Glasenapp (**I, II**) . . . Knorre (3632) . . . *Annals Toulouse Obsy.* **III** . . . Boeger (*A. J.* 522) . . . Thiele (3837) . . . β^6 . . .]

8563. **H 2832.** "A very red, almost ruby." Only orange or reddish with the 6-inch, 1875. 21 9

1904.52	23°4	22″86	3*n*	Miller	9.0 . . . 10.5
1905.70	19.0	22.77	1*n*	β^6	8.7 . . . 10.8

8564. **WZ.** "Double" in *Washington Transit Zones.* Measures from Glasenapp (I). 21 29

1905.41	182°2	41″90	1*n*	β^6

8565. **H N. 125.** Near λ *Sagittarii.* The distances are very discordant. The following are all the measures: 21 33

1889.77	99°0	1″62	1*n*	Ho	8 . . . 8
1897.70	101.8	3.14	2*n*	See	8.0 . . . 8.3
1900.60	281.7	2.71	2*n*	β	8.0 . . . 8.1
1903.64	102.0	3.05	2*n*	Scott	7.5 . . . 7.8

[Ho (*A. J.* 215) . . . . Ho (3234) . . . . See (3496) . . . . Scott (*Mon. Not.* **LXIV**, 52) . . . . β^5 . . .]

8567. **β 264.** This was noted with the 9.4-inch of the Dartmouth College Observatory. I could not see it with the 12-inch in 1891, nor recently with the 40-inch. There is no doubt of the identity of the star. It is described in the original catalogue as $1^m\ 29^s$ *f* Σ 2315. It was noted as "excessively faint" with the 9.4-inch, and it is possible that the companion has no real existence. 21 43

[β (**V**) . . . β (*Mon. Not.* **XXXV**, 31) . . .]

$21^{m}\ 45^{s}$ **8568.** **β** 464. Discovered with the 6-inch. There is a third star 11 m, 90°: 25″.

1891.61	108°.2	1″.03	3*n*	*β*
1898.53	108.4	1.12	3*n*	Doo
1905.48	110.6	1.17	3*n*	Doo

[*β* (**IX**)...*β* (*Mon. Not.* **XXXVIII**, 78)...*β* (3114)(*Pub. L. O.* **II**)...*Δ* (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

21 51 **8569.** **β** 1326. Noted with the 40-inch while observing Σ 2318 *rej.* Measures by *β*⁶ C is DM (26°) 3260.

21 59 **8571.** **β** 134. (= **OΣ** 543.) Discovered with the 6-inch, but it had been seen before at Poulkowa, and is OΣ 543, one of the subsequently published additions to the Poulkowa Catalogue (*Poulkowa Observations*, Vol. IX). There is no change in the components.

1861.32	138°.9	1″.24	2*n*	OΣ	7.2... 9.2
1879.47	136.1	0.95	1*n*	*β*	8.0...10.0
1896.52	137.3	1.15	3*n*	Lv	7.7... 9.7
1898.59	132.9	1.06	3*n*	Hu	
1901.75	133.4	1.08	2*n*	Bryant	

[*β* (**III**)...*β* (*Mon. Not.* **XXXIV**, 59)...*β*³...OΣ (**IX**)... *Δ* (**I**)... Lv (*A. J.* 407) .... Hl (**II**).... Greenwich Obsy. (*Mon. Not.* **LIX**, 418; **LX**, 509; **LXI**, 486; **LXII**, 383)...HΣ (**XII**) ...Hu (*Pub. L. O.* **V**)...]

22 ± **8573.** **H** 5497. "R. A. precarious. *Orange : green.*" Nothing found here, or by sweeping some distance each way. Probably small stars (1876).

22 10 **8574.** 39 *Draconis.* **Σ 2323.** (= **H I.** 7 = **Sh** 269. AC = **Σ** 36 **App. I.** = **OΣ** (**App**) 169.) No change in C. The angle of AB appears to be a little less, and distance larger. The principal star has a proper motion of 0″.065 in 326°.5 (Auwers).

A and B

1865.48	360°.9	3″.44	7*n*	*Δ*
1884.58	359.6	3.63	6*n*	Hl
1898.81	355.5	3.50	6*n*	Maw
1903.12	358.2	3.68	3*n*	Do

A and C

1868.26	21°.3	89″.12	6*n*	*Δ*
1895.71	20.8	88.97	2*n*	Maw
1903.12	20.8	88.80	3*n*	Do

[Ma (*F. S.* **II**)...Ma (**XI**, **XIII**, **XV**)... Ma (324)... H¹...Wr...Se... Ra (**XXV**, **XXVI**)...Flm...OΣ (**IX**, **X**)...*Δ* (*Mem. Accad. Sci.*)...*Δ* (1032, 1116, 1194)...*Δ* (**I**, **II**, pp. 424, 581)...Bl (**V**)...Big...Pk...Nobile (*R. Accad. Sci.* Napoli, Dec. 1877)...WS...WS²...Sk...Seagrave (*Sid. Mess.* **II**, 22)...Hl (**I**, **II**)...Do (2316, 3931)...See (*Beob. Berlin*, No. 6, 1892)...Je (2340)...Franz (2649)...En (2677) ... Glasenapp (**III**) ... Maw (**III**, **IV**) ... Bryant (*Mon. Not.* **LX**, 509)...Espin (*Mon. Not.* **LXII**, 530)...]

22 11 **8575.** **Hu** 66. (AC = **OΣ** 351.) The principal star of OΣ 351 was found to be a close pair by Hussey with the 36-inch. It is one of the closest triple systems known. There has been no material change in the OΣ companion.

A and B

1901.54	307°.7	0″.34	2*n*	Hu
1903.73	310.2	0.30	1*n*	Biesbroeck

AB and C

1870.49	29°.2	0″.58	2*n*	*Δ*
1878.94	24.9	0.55	2*n*	*β*
1886.72	27.6	0.60	2*n*	Hl
1898.59	27.6	0.57	6*n*	Hu

The position by Hu is a mean of his measures of AC and BC:

AC	1898.59	12°.5	0″.63	3*n*	Hu
BC	1898.59	42.8	0.51	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...*Δ* (**I**)...Flm...*β*¹...*β*³...Per...Per (2560)...En (2742)...T (2866)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Big (*Bul. Ast.* **XII**, 299)... Glasenapp (**IV**) ... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 509; **LXI**, 486; **LXII**, 383) ... Hu (*A. J.* 480)(*Pub. L. O.* **V**)(*A. S. P.* **X**, 182) ... **HΣ** (**XII**) ... Biesbroeck...Lau (4054)...]

8576. **H** 1325. "Neat." Distance apparently greater; *f* a 6 m star (1876). $22^{m}\ 16^{s}$

1904.73	298°.4	4″.63	3*n*	Cg	10.5...11.5
1905.75	297.4	6.67	1*n*	*β*⁶	10.8...11.5

8578. *φ Draconis.* **OΣ** 353. No sensible change in the last fifty years. There is a small proper motion, 0″.027 in 319°.7 (Auwers). 22 29

1868.77	63°.6	0″.5 ±	6*n*	*Δ*
1878.59	52.2	0.39	8*n*	Hl
1881.12	57.7	0.44	9*n*	*β*
1898.86	50.8	0.38	6*n*	Hu
1903.92	55.4	0.40	3*n*	Biesbroeck

[Ma (**XI**, **XIII**)... OΣ (**IX**, **X**)... Da³... Se ... Flm ...Do (2322)... *Δ* (**I**, pp. 187, 393)...Hl (**I**, pp. 20, 26)...Per...T (2991)...En (2662)...*β*³...*β*⁴...Glasenapp (**III**)...Big...Big (*Bul. Ast.* **XII**, 299)... Com (**X**)...Hu (*Pub. L. O.* **V**)... Biesbroeck...Lau (4054)...]

8579. **Σ** 2319. (= **S** 702.) Some change in AC. 22 30

A and B

1865.71	191°.0	5″.49	4*n*	*Δ*
1890.52	191.2	5.60	5*n*	Giacomelli
1903.67	192.6	5.53	1*n*	Lewis
1905.76	190.5	5.24	1*n*	*β*

A and C

1866.40	276°.6	38°.67	3*n*	*Δ*
1894.52	275.3	39.42	2*n*	Gla
1905.76	274.4	39.82	1*n*	*β*

[Ma (*F. S.* **I**)...Ma (**X**, **XI**)... H¹... H (**V**)... Da²... Da³...Wr... Se... Giacomelli (**III**)...Ba (**I**, **II**)...Du...Ra (**XXIII**)...WS²...*Δ* (1209)...*Δ* (**I**, **II**)...Glasenapp (**I**, **III**)...*Annals Toulouse Obsy.* **III**...Lewis (*Mon. Not.* **LXIV**, 803)...Coleman (*Mem. R. A. S.* **LIV**)...*β*⁶...]

8581. **Ho** 433. Probably fixed. 22 37

1904.53	331°.1	9″.15	3*n*	Doo

[Ho (3234, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8582. **OΣ** (**App**) 168. No sensible change. 22 38

1903.54	164°.5	47″.60	3*n*	*β*

[*Δ* (**I**)...*β*⁶...]

22^{m} 38^{s} **8583.** **A. G. 223.** Noted as double in *A. G. Berlin*, but found single by Miller (*A. J.* 546).

22 50 **8584.** **Σ 2320.** *Herculis* 457. Change doubtful.

1868.39	9°2	1″63	5*n*	Δ
1892.72	0.2	1.91	1*n*	Gla
1896.69	8.3	1.18	1*n*	Ho

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Δ (**II**)...Cin^{5}...Glasenapp (**II**)...Ho (3558)...]

22 59 **8585.** **H 859.** The magnitude in DM is 8.3.

1905.52	216°7	17″03	2*n*	β^{6}	8.6...10.5

23 : **8586.** **Hu 65.** "A 12 m star, 24°5 : 9″10."

[Hu (*A. J.* 480)...]

23 6 **8588.** **OΣ 352** *rej.* Unchanged. Not measured by OΣ.

1898.50	222°2	24″33	3*n*	Hu

[Ma (**XI, XIII**)...Δ (I)... Glasenapp (**IV**)... Espin (3717)... Hu (*Pub. L. O.* **V**)...]

23 12 **8590.** **Howe 43.** (= **β** 1128). In 1897 See thought the principal component was a close pair (See 353), but Cogshall in 1899, with good conditions, found it single. The Howe companion is probably fixed.

1889.42	198°6	3″17	3*n*	β
1899.65	200.7	3.27	3*n*	Cogshall
1900.51	202.5	3.47	2*n*	Doo
1900.53	197.0	2.91	3*n*	A

[Cin^{4}...β (**XVI**)...β (2956) (*Pub. L. O.* **II**)...Howe (Cin^{4})...Lv (*Proc. Haverford Coll. Obsy.* 1892)...See (*A. J.* 431) ... Cogshall (*A. J.* 486)... A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

23 52 **8594.** **Σ 2321.** Fixed.

1866.26	191°0	6″59	3*n*	Δ
1894.53	190.8	6.62	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**III**)...]

24 8 **8595.** **Σ 2322.** Fixed.

1866.77	168°9	20″32	3*n*	Δ
1879.50	168.7	20.15	1*n*	β
1905.52	168.3	20.11	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**V**) ... Flm ... Δ (2195) ... Δ (**II**) ... Pt ... Cin^{5}...β^{3}...β^{6}...]

24 21 **8596.** **Hd Zones.** "Double" in *Harvard Zones*. Measures from Cin^{5}.

(See p. 1080)

24 24 **8597.** **See 354.** A later position is:

1899.67	183°0	24″78	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8598. **Σ 2327.** Without change. In DM 8.3 m. 24^{m} 33^{s}

1878.44	316°0	19″01	1*n*	β	
1903.57	315.3	19.29	3*n*	β	8.3...10.5

[H (**IV**)...Δ (1736)...β^{1}...β^{6}...]

8599. **Ho 434.** Probably unchanged. 24 33

1904.50	186°2	12″08	3*n*	Doo

[Ho (3234, 3558)...]

8601. **Σ 2332** *rej.* Measures from β^{5}. Not in DM, but near DM (64°) 1267, the place of which is given. 24 42

8602. **H 1326.** The only later observations are: 24 43

1880.58	18°7	.....	1*n*	Big	10.5...11
1904.71	17.2	13″69	3*n*	Miller	10 ...10

8603. **A 245.** No other measures. 24 45

[A (3784) (*Bul. L. O.* No. 16)...]

8604. **OΣ (App) 170.** The only other measure is: 24 45

1903.38	5°8	101″32	3*n*	β

[Δ (I)...β^{6}...]

8605. **Σ 2325.** (= **H** N. 54.) Fixed. 24 46

1866.32	256°5	12″25	3*n*	Δ
1905.55	257.4	12.21	1*n*	β

[Ma (*F. S.* **I**) ... H (**VIII**) ... Mh ... Δ (**II**) ... Cin^{5} ... Glasenapp (**I**) ... *Annals Toulouse Obsy.* **III**...β^{6}...]

8607. **Σ 2328.** No motion. 24 51

1868.64	74°1	3″43	4*n*	Δ
1894.55	73.0	3.79	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**IV**) ... Se ... Δ (**II**) ... Glasenapp (**III**) ... *Annals Toulouse Obsy.* **III**...]

8608. **Σ 2334** *rej.* Measures from H (V); "another 14 m near." 24 51

1903.58	205°2	14″48	2*n*	Es
1905.76	206.7	14.38	1*n*	β

[Espin (*Mon. Not.* **LXIV**, 680)...β^{6}...]

8609. **Σ 2324.** Unchanged. 24 53

1866.84	143°9	2″28	3*n*	Δ
1894.52	147.4	2.48	*n*	Gla

[Ma (*F. S.* **I**) .... Ma (**X**) .... Δ (**II**) .... Cin^{5}.... Glasenapp (**I, III**).... *Annals Toulouse Obsy.* **III**...]

$25^{m}\ 21^{s}$ **8613.** **Ho** 435. Three distant faint companions.

1904.59	223°2	0″81	3*n*	Doo

[Ho (3234)...]

25 25 **8614.** **β** 966. Discovered with the 18½-inch. This is the principal star in the cluster, Messier 25. In Heis 6–7 m; Gould, 7¼; B. A. C. 7. There is a wide pair of small stars in the field *sp* measured in Cin^{6}; 173°0 : 10″96 : 8.0...8.5 (1879.39) 1*n*.

B and C

1898.68	120°6	0″70	1*n*	A	8.0... 9.5
1898.75	120.5	0.72	4*n*	Cg	9.8...10.2
1900.50	123.1	0.76	3*n*	Doo	

A and BC

1898.68	252°9	66″82	1*n*	A
1898.75	252.7	66.62	3*n*	Cogshall
1900.50	252.8	66.50	3*n*	Doo

[β (**XIII**)...β^{3} (pp. 196, 299)...A (3585)...Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **II**)...]

25 33 **8615.** **Σ** 2329. No motion.

1866.56	44°8	4″01	3*n*	Δ
1894.52	45.5	4.19	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Da^{3}...Δ (**II**)...Glasenapp (**III**)...*A. G. Leipzig*, p. 249...]

25 35 **8616.** **A** 246. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

25 36 **8617.** **β** 247. Discovered with the 6-inch. Without change.

1879.56	168°0	7″56	2*n*	Cin
1888.56	167.9	7.99	2*n*	Lv
1891.66	166.8	7.69	2*n*	Collins
1901.82	167.4	7.62	4*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (**I**)...Cin^{5}...Cin^{6}...Lv^{1}...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Doolittle (*Pub. Flower Obsy.* **II**)...]

25 41 **8618.** **Σ** 2330. (= **H** 1327.) Error of 2^{m} R. A. in H. The change in distance is due to proper motion.

1829.28	176°9	20″31	3*n*	Σ
1867.62	174.2	19.18	7*n*	Δ
1877.66	173.8	19.00	3*n*	Sp
1886.69	173.3	18.90	3*n*	Hl
1903.38	172.3	18.55	3*n*	β

These five sets of measures give 0″030 in 211°4 for the most probable proper motion of A.

[Ma (*F. S.* **II**)...Ma (**XIII, XV**)...H^{1}...Flm...WS...Gl...Sk^{2}...Pl...Δ (1572)...Δ (**II**)...Sp (**II**)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk^{5}...Do (3931)...Coleman (*Mem. R. A. S.* **LIV**)...β^{6}...]

8619. **β** 419. Discovered with the 6-inch. Change uncertain. All the later measures are given. $25^{m}\ 42^{s}$

1888.52	56°6	1″32	2*n*	Lv
1901.49	48.1	1.49	7*n*	Doo
1905.45	50.5	1.32	6*n*	Doo

[β (**VII**)...β (2103)...Δ (**I**)...Lv^{1}...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

8620. **β** 420. Discovered with the 6-inch. No motion. 25 53

A and B

1880.44	277°4	1″64	2*n*	β	8.5...10.2
1893.44	276.6	1.80	3*n*	W	8.8...10.5
1905.48	276.4	1.80	3*n*	Doo	9.1...10.7

A and C

1893.44	200°5	21″42	3*n*	Wilson

[β (**VII**)...β (2103)...β^{3}...Δ (**I**)...Wilson ( )...]

8622. **OΣ** 354. No change in distance, but slow increase in the angle. 26 12

1843.42	150°4	0″72	2*n*	Ma
1846.75	154.5	0.79	3*n*	OΣ
1856.67	159.2	0.45	1*n*	Se
1865.63	159.5	0.60	1*n*	Se
1868.62	157.5	0.81	4*n*	Δ
1878.14	162.1	0.98	4*n*	Sp
1884.02	166.0	0.92	7*n*	Per
1886.59	164.4	0.91	4*n*	Hl
1898.51	166.9	0.83	4*n*	Hu
1899.62	170.1	0.89	3*n*	Bryant
1903.70	168.1	0.88	2*n*	Biesbroeck
1905.56	167.3	0.80	3*n*	Doo

[Ma (**XI, XIII**)... Se.... Se^{2}... Δ (**I**)... OΣ (**IX**)... Sp (**II**)... Per.... Per (2560, 2685)....Hl (*Wash. Obsns.* 1886)....Hl (**II**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXIII**, 403)....Hu (*Pub. L. O.* **V**)....Biesbroeck...]

8623. **A** 248. No other measures. 26 18

[A (3784) (*Bul. L. O.* No. 16)...]

8624. **A** 247. No other measures. 26 21

[A (3784) (*Bul. L. O.* No. 16)...]

8625. **Σ** 2335. Fixed. 26 27

A and B

1868.00	322°0	11″64	4*n*	Δ
1880.42	321.7	11.71	1*n*	β
1905.70	322.1	12.00	1*n*	β

A and C

1867.42	151°4	24″01	3*n*	Δ
1880.42	151.3	23.67	1*n*	β
1905.70	150.9	24.36	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Bl (**V**)...Δ (**II**)...Cin^{5}...β^{3}...β^{6}...]

26^m 38^s **8628.** **Σ** 2333. (= **S** 703.) Fixed.

1869.01	334°.3	6″.32	4*n*	Δ
1894.58	333.4	6.34	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^1...H (**IV**)...Se...Bp...Wr...Ra (**XXIII**)...Ba (**II**)...Bl (**V**)...Δ (1125, 1194)...Δ (**I, II**)...Du...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

26 45 **8630.** **β** 642. Discovered with the 18½-inch. One of the principal stars in the cluster, Dreyer 6649. Fixed. The later measures are:

1891.62	91°.4	4″.14	3*n*	β	8.9...10.9
1901.62	89.9	4.12	4*n*	Doo	9.2...11.2
1905.49	89.2	4.08	3*n*	Doo	

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

26 50 **8631.** **Σ** 2338. Without change.

1866.23	300°.1	13″.09	3*n*	Δ
1904.31	300.8	12.91	2*n*	β

Struve mentions a third star, 209°.1 : 77″.1.

1863.54	208°.7	77″.43	1*n*	Δ
1904.31	208.0	76.92	2*n*	β

The 40-inch shows a 13.5 m star near C, 61°.2 : 14″.2.

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H (**IV**)...Bl (**V**)...Δ (**II**)...Glasenapp (**V**)...]

27 6 **8632.** **H** 1328. The only later position is:

1900.62	111°.8	21″.31	2*n*	Espin (3717)

27 12 **8633.** **Hu** 245. A later measure:

1903.62	54°.2	2″.00	2*n*	Biesbroeck

[Hu (*A. J.* 494)...Biesbroeck...]

27 20 **8634.** **Σ** 2336. Unchanged.

1866.87	8°.7	6″.19	3*n*	Δ
1903.67	8.3	6.25	1*n*	Lewis
1905.76	9.5	6.39	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...*A. G. Leipzig*, p. 210...Lewis (*Mon. Not.* **LXIV**, 803)...β^6...]

27 21 **8635.** **H** 861. The only measure is:

1904.83	175°.6	8″.36	1*n*	Miller	10...11

27 38 **8636.** **OΣ** 355 *rej.* (= **H** 862.) "*White : purplish,*" H. Ma measured the principal star as a close pair, 18°.2 : 0″.25± (1843.55) 2*n*, but it has never been seen by anyone else since, and the elongation was probably not real. Se noted it as single in 1857; I found it certainly round in 1876 and 1878 with the 18½-inch, and it was single to Hu with the 36-inch in 1900.

There is no change in the distant star. Excluded in the second edition of the *Poulkowa Catalogue.*

1898.59	248°.7	38″.95	3*n*	Hu

[Ma (**XI**)...Se...Δ (**I**)...β^1...Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

8637. **Schj** 18. From list of new pairs by Schjellerup (*A. N.* 1485). Measures by β^5. There is a 13.5 m star near A, 119° : 14″.5. 27^m 49^s

8639. **Σ** 2337. (= **H** 595.) Fixed. 28 5

1866.89	298°.0	16″.27	3*n*	Δ
1877.66	297.7	16.42	2*n*	Sp

[Ma (*F. S.* **II**)...Ma (**XIII**)...H (**VIII**)...Mh...Δ (**II**)...Sp (**II**)...Cin^5...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...]

8640. **β** 1253. *Lyrae* 28. Discovered with the 36-inch. 28 15
This is a naked-eye star in *Lyra;* Heis 6.5 m; Harvard 5.7. Lalande 34418. Kustner gives this star a proper motion of 0″.015 in the direction of 350°.2. No relative change.

1898.75	157°.1	7″.31	3*n*	A	6.0...13.2
1901.59	156.5	7.56	2*n*	Doo	

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**...]

8642. **Hu** 322. (AC = **Σ** 2339.) The principal star of 28 27
Σ 2339 was found to be a close pair with the 36-inch in 1901. No other measures of this. It is very probable that the three components make a physical system. They have a common proper motion of 0″.057 in 251°.7 (*A. G. Berlin*).

There is no change in the Struve companion.

AB and C

1867.79	270°.7	2″.30	4*n*	Δ
1875.65	271.3	2.33	4*n*	Sp
1901.61	270.6	2.45	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H^2...Da^1...Wr...Se...Se^2...Du...Ba (**II**)...Ra (**XXV**)...Δ (1209)...Δ (**I, II**)...Sp (**II**)...Glasenapp (**III**)...Knorre (3632)...*Annals Toulouse Obsy.* **III**...Lewis (*Mon. Not.* **LXIV**, 803)...Coleman (*Mem. R. A. S.* **LIV**)...Hu (*Bul. L. O.* No. 12)(*Pub. A. S. P.* **XIII**, 157)...]

8643. **Σ** 2340. Change from proper motion. The annual 28 30
movement seems to be about 0″.022 on the line joining the components.

1830.43	104°.6	21″.51	3*n*	Σ
1866.29	103.3	22.33	4*n*	Δ
1879.31	102.8	22.70	2*n*	Cin
1880.41	103.3	22.76	1*n*	β
1894.59	103.3	22.68	2*n*	Gla
1901.44	103.6	23.09	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (1572)...Δ (**II**)...Flm...Bl (**V**)...Cin^5...β^3...Glasenapp (**III**)...β^5...]

8646. **OΣ** (App) 171. The proper motions are given in 28 50
the *Paris Catalogue:*

A = 0″.082 in 154°.6
B = 0.150 in 90

1829.5	315°.6	139″.33		Weisse
1849	313.9	140.33		Rad
1881.6	310.5	141.84		A. G.
1885.83	319.7	142.08	4*n*	Franz
1903.35	320.7	142.48	2*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

28^m 52^s **8647.** **See** 355. The later measures give a smaller distance.

1899.64	240°1	11″76	Cg	6.3...12.8

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]
(See p. 1080)

29 14 **8648.** **Ho 86.** Probably unchanged.

1895.15	173°5	0″3 ±	2*n*	Ho
1900.66	181.7	0.29	1*n*	Lewis
1905.04	175.4	0.34	6*n*	Doo

[Ho (2778, 3558)...Lewis (*Mon. Not.* **LXI**, 486)...Doolittle (*Pub. Flower Obsy.* **II**)...]

29 16 **8649.** **Hu** 931. (AC = **Σ** 2343.) Since Part I was in type, Hussey has found that the principal component of Σ 2343 is a close pair. His measures give:

A and B

1905.17	248°2	0″67	2*n*	Hu	10.0...10.0

Probably no change in the Struve companion.

1868.48	214°9	8″37	4*n*	*Δ*
1904.78	211.7	8.88	2*n*	Duncan

[Ma (**XI**)...Ma (*F. S.* **II**)...*Δ* (**II**)...Hu (*Bul. L. O.* No. 74)...]
(See No. 13422)

29 20 **8650.** **OΣ** 356 *rej.* Rejected in second edition of the *Poulkowa Catalogue.* Some change in the distance of AB from proper motion.

A and B

1843.66	307°7	40″25	1*n*	Ma
1866.67	306.5	38.33	3*n*	*Δ*
1895.63	305.9	36.41	2*n*	Gla
1898.56	305.8	36.31	3*n*	Hu
1900.85	306.0	36.04	2*n*	*β*

A and C

1895.63	46°5	45″74	2*n*	Gla
1898.56	47.0	45.57	3*n*	Hu

B and C

1895.63	4°0	52″86	2*n*	Gla
1898.56	4.2	52.83	3*n*	Hu

[Ma (**XI**)....*Δ* (**I**)....Glasenapp (**IV**)....Espin (3717)....Hu (*Pub. L. O.* **V**)....*β*^{5}....]

29 21 **8651.** **Σ** 2341. Fixed.

1866.35	265°6	15″18	3*n*	*Δ*
1904.59	264.1	15.15	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin^{6}...*β*^{3}...]

29 32 **8653.** **Ho** 567. The only later measure shows no sensible change.

1905.50	157°0	1″18	3*n*	Doo

[Ho (*A. J.* 215)(3557)...]

8654. **β** 643. (AC = **Σ** 2342.) The nearest companion was detected with the 18½-inch. The change in Struve's star is evidently due to the proper motion of A. The measures of AC in 1830 and 1898 give this as 0″05 in the direction of 144°, and this movement accounts for the change in AB. There was a time when these two stars were separated by a distance of about 2″. 29^m 41^s

A and B

1878.23	338°2	8″86	3*n*	*β*
1891.67	336.3	9.27	3*n*	*β*
1898.49	334.5	9.39	1*n*	Doo
1898.53	335.8	9.59	3*n*	A
1899.75	334.2	9.76	3*n*	Doo
1905.70	335.3	10.00	1*n*	*β*

A and C (= Σ 2342)

1830.71	11°9	26″91	4*n*	Σ
1865.58	9.3	28.07	5*n*	*Δ*
1877.63	9.2	28.88	7*n*	Je
1891.67	7.3	29.12	3*n*	*β*
1898.53	7.0	29.28	3*n*	A
1899.75	6.4	29.57	3*n*	Doo

[*β* (**X**)...*β*^{1}...*β*^{3}...*β* (3114)(*Pub. L. O.* **II**)(*Ast. and A.-P.* **XIII**, 16)...Doolittle (*Pub. Flower Obsy.* **I**)...A (3585)...*β*^{6}...]

There are many measures of the wide pair, of which enough are given to show the character and extent of the relative motion. All the measures will be found in the following:

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**V, VII**)...*Δ* (1573)...*Δ* (**II**)...Gl...Sk^{2}...Sk^{5}...Je (2369)...Glasenapp (**III**)...HΣ (**XII**)...*Annals Toulouse Obsy.* **III**...]

8655. **Barnard** 10. Discovered by Barnard at Mt. Hamilton. The only other measure is: 29 47

1898.47	123°5	0″32	3*n*	A	8.7...9.5

[Barnard (*A. J.* 447)...A (3585)...]

8656. **O. Stone** 43. Nothing later but the following: 29 56

1903.42	29°6	10″20	3*n*	*β*	8.8...9.9

[Cin^{5}...*β*^{6}...]

8658. **Σ** 2344. In two later observations in the first series, Σ noted, "duplex non amplius cognita." In 1835.63 from 2*n* he found, 178°8 : 1″62 : 8.7...11.5. This pair was not seen by Ma in 1842, Se in 1859, *Δ* in 1862, and En and Se in 1865. I readily saw it double, and measured it, in 1878. Evidently no change has taken place. It is a very insignificant star, 9.3 in DM. The only near star of any prominence is a 7.6 m star, 32^{s}7 *p*, and 1′4 *n*, and this is probably the star that has been examined heretofore for Σ 2344. The brightness of A is overrated in Σ. 30 19

1878.44	180°4	1″58	1*n*	*β*
1903.41	175.1	1.42	3*n*	*β*

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Se^{2}...*Δ* (1736)...En (1674)...*β*^{1}...*β* (2106)...*β*^{6}...]

30^m 21^s **8659.** **OΣ** 357. There is some change in the angle, but the measures are not very accordant.

1845.15	275°5	0″48	2*n*	OΣ
1855.67	264.4	0.53	3*n*	OΣ
1872.58	256.9	0.53	2*n*	OΣ
1878.64	258.9	0.52	1*n*	β
1878.75	251.3	0.37	2*n*	Δ
1883.94	254.7	0.40	6*n*	Per
1887.59	252.0	0.33±	5*n*	Sp
1889.21	252.8	0.42	3*n*	β
1894.69	250.4	0.36	4*n*	Com
1898.52	244.5	0.43	4*n*	Hu
1903.56	241.9	0.40	3*n*	Do
1905.56	244.2	0.50	3*n*	Doo

[Ma (**XI, XIII**) ... OΣ (**IX, X**) ... Se ... Se^2... Δ (I)... Flm... Per... Per (2560, 2685)...Sp (**II, II** App.)...En (2786) ...β^1... β (2957) (*Pub. L. O.* **II**)...Com (**X**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**).... Do (3931)...Biesbroeck...]

30 23 **8660.** **Σ** 2345. Distance and angle slowly increasing. Apparently rectilinear motion.

1865.21	194°1	7″70	4*n*	Δ
1879.37	196.6	7.41	2*n*	Cin
1884.39	200.7	8.34	6*n*	En
1886.72	201.0	8.28	4*n*	Hl
1895.71	203.3	8.80	2*n*	Collins
1901.44	203.9	8.55	2*n*	β

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...H (**V**)... Flm ... Δ (1572)... Δ (**II**)... Big...Hl (*Wash. Obsns*, 1886)...Hl (**II**)...Cin^5...En (2677)...Collins (*A. J.* 378)...HΣ (**XII**)...Bowyer (*Mon. Not.* **LXIV**, 803)...β^b...]

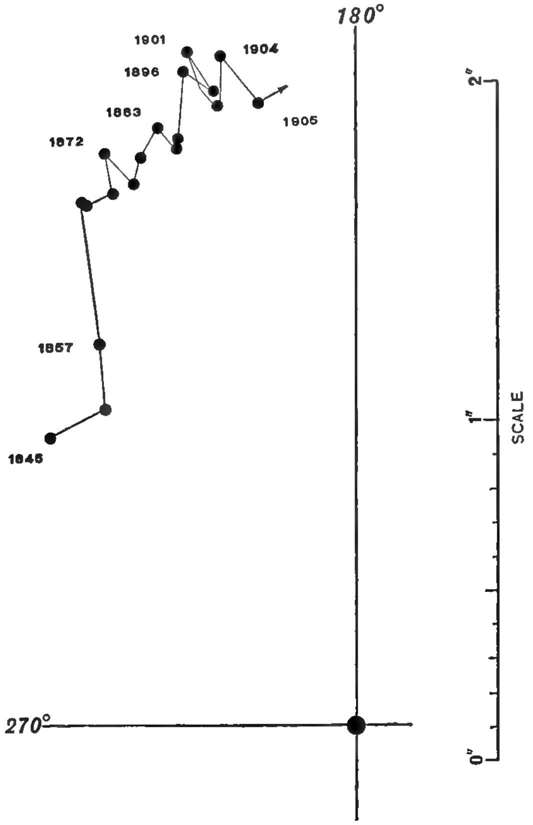
30 31 **8662.** **OΣ** 359. B. A. C. 6341. Perhaps slow retrograde motion. Some observers have reversed the angle.

1870.37	352°7	0″53±	7*n*	Δ
1880.23	351.6	0.46±	9*n*	Sp
1888.68	347.0	0.44	4*n*	Sp
1898.68	342.0	0.35	6*n*	Hu
1903.50	341.3	0.38	2*n*	Biesbroeck

[Ma (**XI, XIII**)... OΣ (**IX**)...Da^3...Se ...Se^2...Du...Ferr...Do (2330)... Δ (**I**) ...Flm ... Per ... Per (2749) ... Newcomb (*Wash. Obsns.* 1875)...Sp (**II, III**) ...T (2899)... Glasenapp (**III**)... Big (*Bul. Ast.* **XII**, 299)... Brown (3646)... Hu (*Pub. L. O.* **V**)...Do (3931)...Biesbroeck...]

30 32 **8663.** **OΣ** 358. Binary in slow retrograde motion. The system has a proper motion of 0″100 in 160°6 (*A. G. Berlin*). The relative change in the past sixty years will be seen from the following selected positions:

1845.41	227°0	1″23	3*n*	OΣ
1848.66	218.6	1.18	1*n*	Da
1857.71	214.2	1.35	1*n*	Se
1863.16	207.9	1.73	2*n*	OΣ
1866.68	207.6	1.72	4*n*	Δ
1871.57	204.7	1.72	3*n*	Δ
1872.58	203.9	1.83	2*n*	OΣ
1875.62	202.5	1.72	4*n*	Sp
1879.62	200.9	1.78	3*n*	Hl
1883.95	198°4	1″85	6*n*	Sp
1887.65	197.5	1.77	10*n*	Sp
1889.26	197.1	1.80	12*n*	HΣ
1896.62	194.8	1.98	2*n*	Pt
1898.34	192.9	1.90	3*n*	Hu
1901.65	194.1	2.03	3*n*	Doo
1902.52	192.7	1.83	8*n*	Bowyer
1903.49	192.5	1.86	2*n*	Biesbroeck
1904.03	191.6	2.00	4*n*	Lohse
1905.56	189.1	1.85	3*n*	Doo



OΣ 358

[Ma (**XI**)...Da^3...Se...Se^2...OΣ (**IX, X**)...Ferr...Du... Flm ...Sk... Sk^2... Sk^3...WS^2... Pl... Δ (**I**) ... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (3023)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**) ... Per...Per (2529, 2685)... Sp (2133)...Sp (**II, II** App.)...Callandreau (*Bul. Ast.* **XII**, 523)...Je (2449, 2772, 3802) ... de Ball (2753)... En (2678)... T (2899) ...Maw (**I, III**) ... Glasenapp (**III**) ... Big... Big (*Bul. Ast.* **XII**, 299) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 510, 519; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)... Pt (*A. J.* 397)... HΣ (**XII**)... Hu (*Pub. L. O.* **V**)... Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8664. **H** 864. (= **β** 644 *rej.*) Inadvertently given as new by me. 30^m 34^s

1876.60	316°9	18″03	1*n*	OΣ	6.8...11.0
1878.11	320.0	17.37	2*n*	β	7.0...12.0
1904.69	322.4	17.45	3*n*	Cogshall	

[β^1...β^3...Cin^5...OΣ (**X**, p. 137)...]

30^m 51^s **8665.** **Ho 436.** The *f* star of a triangle.

1904.42	173°9	4″47	3*n*	Doo

[Ho (3234, 3558)...]

31 8 **8667.** **A 249.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

31 12 **8669.** **Σ 2348.** (= **Sh 270.**) B. A. C. 6350. Without change. The proper motions are given in *A. G. Harvard:*

A = 0″052 in 63°8
B = 0.068 in 112.3

Whatever the motion is, it is the same for both stars.

1866.23	272°5	25″77	3*n*	Δ
1895.54	271.9	25.59	2*n*	Gla
1901.52	272.2	25.42	2*n*	Es
1905.78	272.6	25.56	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....Ra (**XXV**)....Bl (**V**)....Δ (1209)....Δ (**I, II**)....T (2898)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 530)...β^6...]

(See p. 1080)

31 16 **8670.** **β 135.** Discovered with the 6-inch. Very difficult with that aperture. Probably without material change. The distance in my single measure in 1879 is erroneously reduced in β^3. It should be as given here.

1879.59	183°9	2″27	1*n*	β
1882.47	187.3	2.49	1*n*	Wilson
1893.54	187.6	2.24	2*n*	Lv
1893.67	188.8	2.26	2*n*	Wilson
1899.57	185.4	2.50	1*n*	Hu

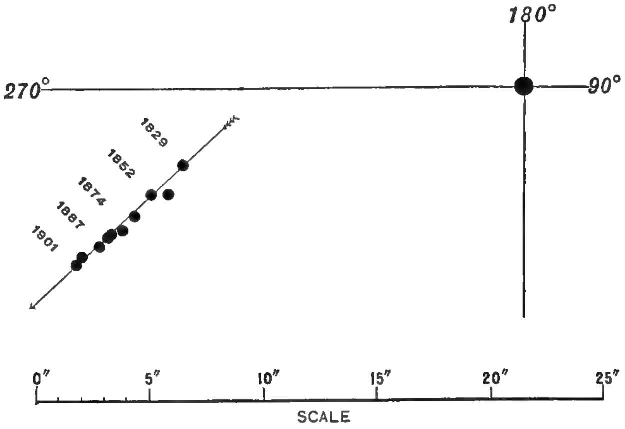
[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^3...Δ (**I**)...Cin^5...Wilson (Cin^{10})...LM....Lv (*A. J.* 278, 382)(*Proc. Haverford Coll. Obsy.* 1892).... Hu (*Bul. L. O.* No. 44)...]

31 34 **8672.** **β 1327.** Found in looking for H 5500 (No. 8686).

[β^6...]

31 27 **8673.** **Σ 2346.** Distance and angle increasing. The motion is rectilinear. Assuming the fixity in space of the small star, A has an annual movement of 0″09 in the direction of 132°5. The measure in Ma (XV, p. 29) evidently belongs to some other pair, probably to Σ 2375.

1829.64	282°9	15″41	4*n*	Σ
1843.69	286.6	16.41	3*n*	Ma
1852.62	286.1	17.04	2*n*	Ma
1864.83	288.2	18.05	5*n*	Δ
1874.65	289.5	18.86	2*n*	WS
1879.68	289.6	19.34	2*n*	Sp
1882.80	289°7	19″49	2*n*	Sk
1887.67	290.5	19.97	2*n*	HΣ
1895.54	290.9	20.89	2*n*	Gla
1901.53	291.5	21.18	2*n*	β



Σ 2346

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Hd...Flm...WS...WS^2...Gl...Δ (1573)...Δ (**II**)...Sk^2...Sk^5...Sp (**II**)...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^5...]

8674. **H 2834.** The brightness of A is much underrated by Herschel. 31^m 33^s

1879.39	250°5	20″13	2*n*	Cin^5	7.0...12.0
1904.31	249.5	20.23	2*n*	β^6	7.2...11.1

8675. **Σ 2353** *rej.* Measures from the Introduction to *Mens. Micr.* The only other measures are: 31 36

1901.31	258°6	13″87	2*n*	β	8.5...11.0
1902.81	260.0	13.98	2*n*	Es	8.9...11.9

DM (58°) 1824, which is 4′4 *s*, is a similar pair with a little smaller distance.

1902.81	224°8	11″75	2*n*	Es	8.2...13.7

[β^5...Espin (*Mon. Not.* **LXIV**, 680)...]

8677. **Σ 2347.** *Serpentis* 196. Unchanged. 31 47

1866.30	257°9	3″29	3*n*	Δ
1891.61	258.1	3.02	4*n*	Gla

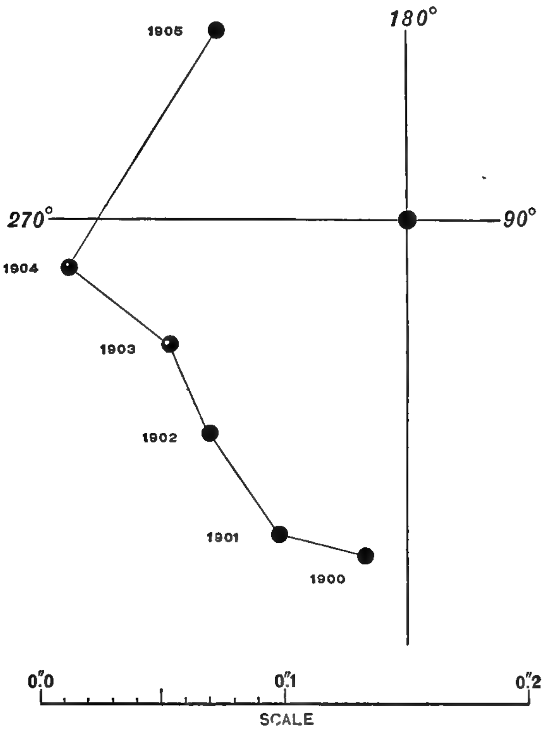
[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... Mh... Se... Se^2... Δ (**II**)... LM... Cin^5... Glasenapp (**I, II**)...]

8678. **Σ 2357.** Unchanged. 32 6

1866.98	270°3	4″38	3*n*	Δ
1879.35	269.5	4.59	1*n*	β
1895.58	269.4	4.53	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... β^3... Glasenapp (**IV**)... Espin (*Mon. Not.* **LXIV**, 677)...]

32m 6s **8679. A 88.** Binary in rapid angular motion. If the change in angle is uniform, the period will be about 15 years, but it may be much shorter.



A 88

1900.46	353°2	0″14	3*n*	A
1901.56	338.3	0.14	3*n*	A
1902.66	318.1	0.12	3*n*	A
1903.44	298.4	0.11	3*n*	A
1904.54	278.4	0.14	4*n*	A
1905.53	224.8	0.12	4*n*	A

[A (3668)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **XIV**, 166; **XV**, 217)...]
(See p. 1080)

32 10 **8680. H 5499.** "A very red."

1890.56	17°4	26″07	2*n*	Gla	8.9...10.0
1904.62	16.6	27.77	3*n*	Miller	
1905.56	17.3	27.91	1*n*	β	9.5...10.7

[Glasenapp (I)...β^6...]

32 13 **8681. Σ 2349.** *Lyrae* 38. Fixed.

1870.39	205°2	7″31	5*n*	Δ
1905.37	204.4	7.37	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...OΣ (IX)...Bl (V)...Δ (II)...β^6...]

32 22 **8684. Σ 2351.** (= **Sh 271.**) Fixed.

1865.56	340°0	5″01	3*n*	Δ
1870.67	339.4	4.95	5*n*	Du
1896.76	339.0	4.95	3*n*	Maw

[Ma (*F. S.* I)...Ma (XI)...H^1...Bp...Wr...Wr (*Phil. Trans.* 1851)...Se...Se^2...Ra (XXIII)...Ba(II)...Δ (1125, 1194)...Δ (I, II)...Du...Glasenapp (I, III)...Maw (III)...*Annals Toulouse Obsy.* III...]

8685. Arg. 32. Measures from *Washington Observations*, 1862. "Duplex" in O. Arg., and "triple" in *Wash. Transit Zones.* 32m 28s

The later measures do not agree with the positions given in 1862. It is not probable that the apparent change is real. The following are all the later measures:

AB	1877.49	216°0	7″07	3*n*	Cin	
	1901.98	217.0	7.29	2*n*	β	8.0... 8.5
AC	1901.98	286.0	53.12	2*n*	β	... 8.4
AD	1901.98	217.6	80.46	2*n*	β	...10.3

The magnitudes of A and C in Cord. DM are 8.5 and 8.8.

[Cin^4...β^5...]

8686. H 5500. "Distance estimated from diagram." Herschel's place is that of the 8.6 m star, DM (2°) 3634, which has no companion. The measures in Cin^5 belong to No. 8656. 32 35

8688. H IV. 59. (= **Σ 2354** *rej.*) Near *Vega.* The following are all the later observations: 32 38

1880.42	303°6	29″80	2*n*	β^3	8.1...9.2
1900.85	302.4	29.46	2*n*	β^5	8.5...9.0

8689. Σ 2352. Without change. 32 39

1866.23	284°0	15″21	3*n*	Δ
1905.39	285.3	15.41	2*n*	β

[Ma (*F. S.* I)...Ma(XI)...Bl (V)...Δ (II)...Cin^5...β^6...]

8690. OΣ 360. Without change. Later observers make the distance a little more. 32 44

1867.16	291°3	1″40	4*n*	Δ
1887.19	291.9	1.41	2*n*	HΣ
1898.46	291.7	1.48	3*n*	Hu
1901.61	294.0	1.51	3*n*	Doo

[Ma (XI)...OΣ (IX)...Δ (I)...β^8...Per...Brown (3646)...Hu (*Pub. L. O.* V) HΣ (XII)...Doolittle (*Pub. Flower Obsy.* II)...]

8691. Hu 675. No other measures. 32 47

[Hu (*Bul. L. O.* No. 57)...]

8692. *a Lyrae.* **Σ 9, App. II.** (AB = **H V. 39** = **Sh 272.**) The faint star C was discovered by Winnecke in 1864. Neither of the companions has any connection with *Vega.* The change in both is explained by the proper motion of the large star, which is 0″344 in the direction of 33°9 (Auwers). 32 53

Some of the later positions are:

A and B

1866.52	150°4	46″36	11*n*	Δ
1878.47	154.9	48.06	2*n*	β
1881.60	155.7	48.93	6*n*	Hl
1886.75	157.0	49.59	3*n*	Eng
1890.59	158.6	50.70	4*n*	Hl
1895.58	160.3	51.47	2*n*	Gla
1905.67	163.5	53.45	3*n*	β

A and C

1878.38	292°0	51″85	3*n*	β
1881.64	292.9	51.48	1*n*	Hl
1899.58	285.1	54.36		Gr. Obsy. photo.

The very faint star, D, was added by Barnard with the 40-inch.

C and D

1897.40	35°3	31″26	1*n*	Barnard

Several nearer companions were alleged to exist by Buckingham in 1867, and the discovery verified by several other observers (See *Mon. Not.* XXVIII, 8, Nov. 1867; *Ast. Reg.* V, 200, 258; VI, 159, 182), but it was shown long since that these stars had no real existence. Similar instances of imaginary companions are found in *Sirius*, *Procyon*, *Polaris*, etc.

[Σ (396) ... Mu ... H (V) ... Da^1 ... Se^1 ... Flm ... Pk ... Flm (*Études et Lectures* **VI**) .... Lassell (*Mon. Not.* **XIX**, 79) .... Wn (1738) .... Bru (*Dunsink Obsns.* **II**) ... Kn ... Gl ... WS^2 ... Sk ... Burton (*Copernicus* **I**, 54) ... Δ (1574) .... Δ (**II**) .... Sadler (*Eng. Mech.* **XLIV**, 10) .... Engelhardt (**II**) .... Hl (*Sid. Mess.* **II**, 1)(*Wash. Obsns.* 1879, App. **I**, 1881) ... Hl (**II**) ... OΣ (**IX**) ... β^1 ... β^2 ... β^3 ... Maw (**I**) ... Glasenapp (**IV**) ... Sk^5 ... Barnard (*A. J.* 414)(*Astrophysical Jour.* **VI**, 148) ... Schaeberle (*A. J.* 418) ... Anderson (*A. J.* 412) ... Greenwich Obsy. (*Mon. Not.* **LX**, 519) ... β^6 ...]

Parallax:

[Callandrelli and Peters (*Rec. de Mem. des Astr. de Poulkowa* **I**, 33, 136) .... Brioschi (*Phil. Trans.* **CVII**, 170) .... Σ (*Mens. Micr. Add.*) .... OΣ (*Mem. Acad. St. Petersburg*, Series **VII**, Vol. 1) ... Johnson (*Rad. Obsns.* **XVI**) ... Brunnow (*Dunsink Obsns.* **I**) ... Hall (*Wash. Obsns.* 1879, 1883) ... Glasenapp (*Refraktsionnya Oklony*) ... Elkin (*Rep. Yale Obsy.*) ...]

32^m 55^s **8693.** **A 250.** No other measures:

[A (3784)(*Bul. L. O.* No. 16) ...]

33 **8694.** **Lewis 25*a*.** Place approximate. Should be near Σ 2356. No. 8695 is given 4′ *s* of this. Later measures are:

1901.59	255°3	1″17	5*n*	Bowyer

[Bowyer (*Mon. Not.* **LIX**, 419; **LX**, 510; **LXI**, 486; **LXII**, 395; **LXIII**, 413) ...]

33 7 **8696.** **H 1331.** The only measures are:

1893.55	208°2	39″10	1*n*	Big	
1905.58	209.3	39.20	2*n*	β	7.0...10.4

[Big (*Bul. Ast.* **XII**, 299) ... β^6]

33 15 **8698.** **Ho 87.** Taken together, the measures do not show any certain change. In most of the later observations the angle is reversed. The following are all the measures, the angles changed to conform to the original position:

1883.69	258°7	0″28	2*n*	Ho
1892.76	264.5	0.25±	1*n*	Ho
1893.61	282.8	0.34	2*n*	Ho
1895.68	278.5	0.30	2*n*	Ho
1896.58	286.7	0.43	1*n*	Lewis
1899.71	282.4	0.32	3*n*	Gr. Obsy.
1900.61	282.8	0.38	3*n*	Gr. Obsy.
1902.09	282.0	0.39	2*n*	Bowyer
1904.59	277.8	0.37	3*n*	Doo

[Ho (2778, 3234, 3558) .... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

(See p. 1080)

8699. **Σ 2350 *rej.*** Lalande 34569. The distance seems to be decreasing. 33^m 30^s

1880.02	196°8	23″27	2*n*	β	6.5...11.5
1901.42	196.2	22.17	2*n*	β	6.7...11.0

[Mh .. β^3 ... β^6 ...]

8701. **Σ 2356.** The angle in Struve seems to be too small. There is no evidence of change in the last sixty years. 33 40

1842.42	55°0	0″81	2*n*	Ma
1856.74	55.2	0.85	2*n*	Se
1870.65	58.2	1.03	9*n*	Du
1877.06	54.7	1.00	4*n*	Δ
1883.52	57.0	1.19	2*n*	Per
1887.66	54.2	0.90	4*n*	Sp
1897.87	54.3	1.00	3*n*	Doo
1902.36	57.0	1.15	4*n*	Bowyer
1903.37	57.1	1.03	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**X**, **XIII**, **XV**) ... Se ... Du ... Flm ... Δ (1736, 2195) ... Δ (**II**) ... WS ... WS^2 ... Gl ... Sk^2 ... Sk^3 ... OΣ (**X**) ... Sp (**II**, **II** App.) ... Per ... Per (2529) ... Ho (2978) ... Glasenapp (**II**) ... En (1674) ... Big (*Bul. Ast.* **XII**, 299) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803) ... Doolittle (*Pub. Flower Obsy.* **I**) ... HΣ (**XII**) ... Do (3931) ... β^6 ...]

8702. **H 1832.** "Small star ruddy." This is No. 14 of the list of new pairs in Ma (XI). The large star seems to have a small proper motion. The companion is DM (24°) 3479. 33 47

1843.77	226°3	25″08	2*n*	Ma	
1873.49	227.6	25.42	1*n*	Δ	7.5...10.0
1903.41	229.1	26.22	3*n*	β	7.8... 9.2

[Ma (**XI**, p. 74) ... Δ (**I**) ... β^6 ...]

8703. **H 1333.** Fixed. The later measures are from the Kirkwood Observatory. 33 49

1875.98	227°0	2″68	3*n*	Δ (I)	9.7...10.2
1903.83	227.5	2.78	3*n*	Howard	
1904.61	224.5	2.88	3*n*	Miller	

8704. **Σ 2359 *rej.*** The following are all the observations: 33 54

1830	283°4	9″±	1*n*	H (V)	10 ...13
1904.64	110.4	23.61	3*n*	Miller	8.7...10.8
1905.42	291.3	23.40	2*n*	β^6	8.5...10.6

34^{m} 0^{s} **8705.** **Σ 2358.** Very little, if any, change.

1868.18	216°.3	2″.52	4*n*	Δ
1878.53	218.5	2.90	1*n*	β
1897.46	221.3	2.60	2*n*	Gla
1903.63	221.3	2.82	1*n*	Bowyer

[Ma (*F. S.* **I**)... Ma (**XI**)... Se... Δ (**II**)...β^{1}...Glasenapp (**V**)...Bowyer (*Mon. Not.* **LXIV**, 803)...]

34 1 **8706.** **Miller.** Discovered by John A. Miller at the Kirkwood Observatory. Measures by Hussey (*Bul. L. O.* No. 44).

34 3 **8707.** **Σ 2355** *rej.* The following are all the observations:

1823	150° ±	40′ ±	1*n*	H (VII)	7 ...13
1904.66	139.6	24.45	3*n*	Cg	6.5...11.5
1905.55	137.8	25.01	2*n*	β^{6}	7.0...10.2

34 5 **8708.** **A. G. 224.** Double in *A. G. Albany.* Measures by Cogshall (*A. J.* 554).

34 5 **8709.** **β 967.** Discovered with the 18½-inch. Probably unchanged. The magnitude in SD is 8.3.

1893.54	191°.1	2″.33	3*n*	Lv
1898.50	194.4	2.21	3*n*	Doo
1898.73	198.3	2.43	3*n*	Boothroyd

[β (**XIII**) ... β^{3} ... Lv^{1}... Lv (*A. J.* 382) ... Doolittle (*Pub. Flower Obsy.* **I**) ... Boothroyd (*A. J.* 478) ...]

34 9 **8710.** **β 50.** Distant double companion noted with the 6-inch. Of no special interest as a double star.

AB	1899.42	8°.7	21″.36	1*n*	β
CD	1899.42	168.0	6.44	1*n*	β
AC	1899.42	329.9	73.52	1*n*	β

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3142) (*Pub. L. O.* **II**)...]

34 11 **8711.** **Σ 2360.** Without change.

1869.25	2°.0	2″.41	5*n*	Δ
1886.56	1.0	2.49	3*n*	Hl
1901.71	1.9	2.59	1*n*	Hu
1903.63	0.8	2.45	1*n*	Bowyer

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII, XV**)... H^{1}... H (**IV**)...Da^{3}... Se... Se^{2}... En (1518, 1674)...WS ... Gl...WS^{2}...Pl...Ferr...Bru ... Giacomelli (**III**)... Δ (**II**)...OΣ (**IX, X**)...Per...Per (2685)...UL...Cin^{5}...Sp (**II**)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Glasenapp (**IV**)...Bowyer (*Mon. Not.* **LXIV**, 803)...]

34 12 **8712.** **Σ 2362.** Without change.

1869.18	180°.3	4″.05	5*n*	Δ
1900.66	182.6	4.08	1*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)... H^{1}...Se...Wr...Ra (**XXI**)...Du... Δ (**II**)... Bl (**V**)...WS...Gl...Per...Per (2559)...Glasenapp (**III**)...Lewis (*Mon. Not.* **LXI**, 486)...*Annals Toulouse Obsy.* **III**...]

8713. **Σ 2365** *rej.* The proper motion of the principal star is: 34^{m} 21^{s}

Porter	0″.282 in 193°.2
A. G. Hels.	0.306 in 189.3

The only measures are of recent date.

1901.43	25°.3	19″.70	2*n*	β	8.3...10.0
1903.24	23.7	19.71	4*n*	Es	7.5... 9.6

[Espin (*Mon. Not.* **LXIV**, 680)...β^{5}...]

(See p. 1080)

8714. **Σ 2361.** Fixed. 34 34

1866.30	211°.3	24″.98	3*n*	Δ
1903.45	211.5	24.71	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)... Δ (**II**)...Cin^{5}...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...β^{6}...]

8715. **S 704.** (= σ 582.) No sensible change. The components are DM (9°) 3816 and 3814. 34 39

1841.55	268°.2	57″.24	2*n*	OΣ	8.2...8.8
1878.07	267.4	56.80	2*n*	OΣ	
1878.31	267.5	57.18	3*n*	Doubiago	
1905.55	266.6	57.09	2*n*	β	

[OΣ (**X**)...Cin^{5}...β^{6}...]

8716. **Σ 2370.** Probably unchanged. 34 53

1868.50	137°.7	10″.41	4*n*	Δ
1897.55	136.3	11.76	2*n*	Gla
1905.79	136.9	10.65	1*n*	β

[Ma (**XI**)... Δ (**II**)...Glasenapp (**V**)...β^{6}...]

8717. **β 1328.** Found with the 40-inch in looking for H 5500 (No. 8686). 34 57

[β^{6}...]

8719. **See 356.** Later measures: 35 2

1899.20	134°.3	3″.39	3*n*	Cg	8.3...8.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8721. **Σ 2364.** Slow motion in angle and distance. 35 9

1868.41	180°.5	7″.06	4*n*	Δ
1903.63	178.2	7.50	1*n*	Bowyer
1904.66	178.8	7.75	3*n*	Miller
1905.72	178.2	7.92	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)... Se... Δ (**II**)... Bowyer (*Mon. Not.* **LXIV**, 803)...β^{6}...]

8725. **2** *Aquilae.* **H V 36.** (= σ 583.) Fixed. The large star is supposed to be a spectroscopic binary, discovered by Wright. It has no sensible proper motion, 0″.008 in 310°.2 (Auwers). 35 42

1879.35	130°.2	52″.39	2*n*	β	5.5...10.0
1905.34	130.6	52.58	2*n*	β	

[β^{3}...Cin^{5}...β^{6}...]

$35^m\ 52^s$ **8728.** **H** 1336. "Pos. and dist. of C est. from diagram." I could not see B with the 6-inch, 1875; C about 12 m of H. The principal star is the one given in *Pos. Med.* for Σ 2367.

AB	1901.28	87°0	17″60	2*n*	β^5	8.2...11.5
AC	1901.30	176.7	32.25	1*n*	β^5	...11.0

There is another 11 m star, 295°9 : 32″6.

35 52 **8729.** **A. G.** 225. Double in *A. G. Bonn.* Measures by Espin (3717).

35 53 **8730.** **Hn** 145. No other measures.

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

35 58 **8731.** **Ho** 437. Probably no change. Ho mentions a 13 m star, 290° : 21″.

A and B

1896.63	109°5	0″34	2*n*	Ho
1901.57	120.2	0.31	4*n*	Lewis
1901.77	121.0	0.43	2*n*	A
1904.58	118.0	0.41	6*n*	Doo

C and D

1901.44	336°1	3″28	2*n*	β
1901.77	343.0	3.35	2*n*	A

AB and C

1901.44	272°6	39″81	2*n*	β

[Ho (3234, 3558)....Lewis and Bryant (*Mon. Not.* **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403)... A (*Bul. L. O.* No. 11)... Doolittle (*Pub. Flower Obsy.* **II**) ... β^5...]

36 7 **8732.** **Σ** 2368. Without change. The proper motion in *A. G. Harvard* is 0″023 in 37°4.

1868.34	150°0	1″81	4*n*	Δ
1903.70	326.8	1.74	2*n*	Espin
1905.66	327.2	1.76	2*n*	β

There is a distant star, first measured by Tarrant. Recent measures show a very decided change in distance. His measures are not very accordant, and the apparent change in 18 years is too great to be probably real unless the proper motion is in the small star.

AB and C	1887.35	131°3	44″27	3*n*	T	...10.0
A and C	1905.69	124.6	36.65	2*n*	β	...11.0

[Ma (*F. S.* **I**)... Ma (**XI**)... Se ... OΣ (**IX**) ... Newcomb (*Wash. Obsns.* 1867) ... Δ (1125, 1194) ... Δ (**I, II**) ... Du ... T (2898)... Maw (**II**)... Glasenapp (**III**) ...Espin (*Mon. Not.* **LXIV**, 677)...β^6...]

36 18 **8733.** **Hd Zones.** "Double" in *Harvard Zones.* Measures from Cin^5.

36 22 **8734.** **H** 1337. "Small star ruddy." The only measure is:

1901.44	162°4	9″04	2*n*	β^5	9.0...11.6

8736. **Σ** 2367. There are but few complete measures of $36^m\ 39^s$
this pair in the half century following its discovery. There has been but little, if any, change in the angle since 1833. I found the distance in 1891 with the 36-inch to be only 0″1, and it is certainly more than double that now. It is possible that the plane of the orbit is in the line of sight, and that nearly one revolution has been made. This can be determined by careful measures of distance hereafter. The differences in the observed angles are no larger than would be expected in a pair of this class.

The following are all the measures:

1833.88	68°3	0″4±	3*n*	Σ
1843.77	70.4	0.3	1*n*	Ma
1846.95	77.8	0.53	3*n*	OΣ
1862.73	66.3	0.55	3*n*	Ma
1874.72	67.8	0.37	2*n*	Newcomb
1875.65	242.3	0.32	4*n*	Sp
1883.62	250.4	0.30	3*n*	Sp
1883.94	62.1	0.22	6*n*	En
1891.43	107.0	0.09	3*n*	β
1892.41	97.6	0.13	3*n*	β
1893.70	250.5	0.3±	2*n*	Gla
1897.52	267.5	0.25	2*n*	Lewis
1899.54	258.8	0.22	3*n*	Lewis
1899.62	255.9	0.30	1*n*	Bowyer
1900.67	85.7	0.18	2*n*	Lewis
1900.74	83.5	0.17	3*n*	Bryant
1901.57	94.1	0.24	4*n*	Lewis
1901.63	76.0	0.23	1*n*	Bryant
1901.77	85.0	0.26	2*n*	A
1902.61	78.2	0.22	1*n*	Lewis
1903.42	69.3	0.13	1*n*	Bryant
1903.65	70.2	0.19	4*n*	Bowyer
1904.32	269.6	0.31	1*n*	Biesbroeck
1905.73	79.4	0.26	2*n*	A

There is no change in the distant companion:

AB and C

1866.24	193°5	14″18	3*n*	Δ
1898.53	192.1	14.17	2*n*	Lewis
1903.84	193.6	14.16	2*n*	Biesbroeck

HΣ adds a fourth star 12 m:

AB and D

1891.59	95°0	22″91	1*n*	HΣ

[Ma (*F. S.* **I**).... Ma (**XI**).... Ma (**XV**) called Σ 2356....H (**IV**).... OΣ (**IX**).... Δ (1194, 1736)... Δ (**I, II**)...Flm... Bl (**V**)... Newcomb (*Wash. Obsns.* 1874) ...Sp (**II, II** App.)...Sp (2133)...Per...Per (2559)...En (2677)...β^3...β (3074, 3114, 3142)(*Pub. L. O.* **II**)....Glasenapp (**III**)....Big (*Bul. Ast.* **XII**, 299).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)... A (*Bul. L. O.* No. 11) ... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)....Biesbroeck...]

8738. **See** 357. Cogshall looked for this on four differ- 36 44
ent nights in 1899, but could not find it. Probably error in place.

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8739. **H** 2836. The only measures are: 36 57

AB	1905.39	324°3	36″92	1*n*	β^6	8.0...11.0
AC	1905.39	258.9	54.72	1*n*	β^6	...11.2

(See p. 1080)

37^m 0^s **8740.** **β** 136. Faint pair noted with the 6-inch. In DM 8.6 m. It is 49^s *p* and 6′ *s* of OΣ 361.

1892.54	7°7	4″68	2*n*	Lv
1899.44	6.8	4.60	1*n*	β
1900.50	6.7	4.72	3*n*	Doo

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59) ... Δ (I)... Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)... Doolittle (*Pub. Flower Obsy.* **I**)...]

37 1 **8741.** **H** 1339. No change.

1873.47	329°9	24″78	1*n*	Δ	7.5... 9.0
1905.53	328.3	24.40	1*n*	β	7.8...10.0

[Δ (I)... Espin (3717)... β^6...]

37 19 **8742.** **See** 358. Another position is:

1899.52	30°1	1″63	2*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

37 26 **8743.** **Σ** 2371. No change.

1867.46	56°5	9″61	3*n*	Δ
1903.63	55.9	9.53	1*n*	Bowyer

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Cin^5... Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**... Bowyer (*Mon. Not.* **LXIV**, 803)...]

37 27 **8744.** **Hn** 146. The only later measure is:

1904.76	193°8	1″53	2*n*	Cogshall

[*Pub. Washburn Obsy.* **II**... Com (**VI**)...]

37 33 **8746.** **Σ** 2377 *rej.* Rad^1. 4028. The only measures are:

1903.14	340°7	15″55	3*n*	Espin
1905.63	339.4	16.82	2*n*	β

[Espin (*Mon. Not.* **LIV**, 680)... β^6...]

(See p. 1080)

37 48 **8748.** **Σ** 2372. (= **H** IV. 94 = **Sh** 273.) Fixed.

1867.28	83°4	25″01	4*n*	Δ
1892.09	83.1	25.04	4*n*	Gla
1905.72	82.7	24.82	1*n*	β

[Ma (*F. S.* **I, II**)... Ma (**XI, XIII**)... Ra (**XXIV**)... Du... Δ (1194)... Δ (I, II)... Bl (**V**)... Maw (I)... Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**... β^6...]

37 49 **8749.** **OΣ** 361. Fixed.

1867.61	172°4	22″67	4*n*	Δ
1898.47	172.2	22.64	4*n*	Hu

[Ma (**XI**)... OΣ (**IX**)... Du... Δ (I)... Glasenapp (**III, IV**)... Hu (*Pub. L. O.* **V**)...]

37 50 **8750.** **O. Stone** 44. Fixed.

1897.72	285°5	1″93	1*n*	See

[Cin^4... LM... Collins (*Proc. Haverford Coll. Obsy.* 1891)... See (3496)...]

8751. **Σ** 2369. Distance decreasing, and motion apparently rectilinear. 37^m 54^s

1857.22	98°7	1″49	5*n*	OΣ
1867.14	96.0	1.32	4*n*	Δ
1878.29	95.3	1.16	6*n*	Sp
1886.56	95.3	1.03	3*n*	Hl
1896.47	92.7	1.13	3*n*	Lv
1901.66	93.6	0.99	3*n*	Bryant
1903.54	95.1	1.10	3*n*	Biesbroeck

[Ma (*F. S.* **I**)... Ma (**X, XIII**)... OΣ (**IX**)... Δ (I, **II**)... Se... Per... Per (2685)... Sp (**II**)... UL... Hl (*Wash. Obsns.* 1886)... Hl (**II**)... T (3185)... Glasenapp (**III**)... Lv (*A. J.* 407)... Brown (3646)... Greenwich Obsy. (*Mon. Not.* **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)... *Annals Toulouse Obsy.* **III**... Biesbroeck...]

8753. **A** 251. No other measures. 38 0

[A (3784)(*Bul. L. O.* No. 16)...]

8755. **β** 645. Discovered with the 18½-inch. On the whole there is little evidence of change. Lalande 34772. 38 1

1883.57	305°0	9″22	2*n*	HΣ
1896.58	303.6	9.53	3*n*	Lv
1898.69	304.9	9.92	3*n*	Doo
1905.70	305.1	9.44	2*n*	β

[β (**X**)... β^1... Δ (I)... Lv (*A. J.* 407)... Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)... β^6...]

8756. **A** 252. No other measures. 38 19

[A (3784)(*Bul. L. O.* No. 16)...]

8757. **H** 5501. The only measure is the following: 38 25

1890.52	7°0	23″62	2*n*	Gla	8.5...9.5

[Glasenapp (I)...]

8759. **Σ** 2384. Undoubtedly binary, but apparently little change in the angle. It was noted as single by Dembowski in 1865, and by me in 1878, so it is possible a double occultation has taken place, and that the companion is returning to the position at the time of discovery. 38 33

1832.34	307°2	0″82	3*n*	Σ
1836.87	318.3	0.65	5*n*	Σ
1841.80	314.7	0.6±	1*n*	Da
1846.69	313.6	0.53	1*n*	OΣ
1851.67	321.3	0.46	1*n*	OΣ
1878,48	Single		1*n*	β
1890.56	306.8	0.41	3*n*	β
1894.01	306.4	0.59	3*n*	Big
1894.53	307.9	0.47	5*n*	Com
1898.81	310.3	0.50	3*n*	Gr. Obsy.
1900.53	311.2	0.63	3*n*	Doo
1900.76	307.6	0.58	2*n*	A

The system has a considerable proper motion:

Porter	0″233 in 324°8
Schroeter	0.243 in 327.4

[Ma (*F. S.* **II**)... OΣ (**IX**)... Ma (**XI, XIII**)... Da^3... Bp... Δ (1736)... Flm... WS... Do (2316)... Sk... β^1... β (3048) (*Pub. L. O.* **II**)... Glasenapp (**III**)... Big (*Bul. Ast.* **XII**, 299)... Com (**X**)... Lewis (*Mon. Not.* **LIX**, 400; **LX**, 510)... A (*Bul. L. O.* No. 11)... Doolittle (*Pub. Flower Obsy.* **I**)...]

38^m 38^s **8760.** **H** 1341. "Est. from diagram." These are all small stars, 11 m, a short distance *p* ε *Lyrae* (1876).

1900.18	287°0	9″90	3*n*	Espin (3717)

38 41 **8761.** **Σ 2374.** No change.

1866.91	37°3	14″82	3*n*	Δ
1898.50	37.8	14.95	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^{5} ... Glasenapp (**V**) ...]

38 52 **8762.** **β** 1254. (= **Ho** 438.) Discovered with the 18½-inch in 1875, but inadvertently omitted from the catalogues of new pairs of that time. It was found independently and subsequently published by Hough. No change.

1889.67	74°5	2″43	2*n*	Ho
1897.58	73.7	2.35	3*n*	A
1901.60	77.3	2.44	3*n*	Doo

[β (**XVIII**) ... β (3113) (*Pub. L. O.* **II**) ... Ho (3234) ... A (3466) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

38 52 **8763.** **Hu** 754. With later measures the mean is:

1904.48	91°1	1″44	3*n*	Hu	7.5 ... 13.8

[Hu (*Bul. L. O.* No. 65) ...]

39 · **8764.** **Ho** 88. No change. This is SD (9°) 4828, and the R. A. 18^h 39^m 26^s.

1895.63	208°6	1″96	2*n*	Ho
1902.63	27.6	1.99	4*n*	Doo

[Ho (2778, 3558) ...]

39 5 **8765.** **Σ 2378.** Fixed.

1866.47	191°9	11″16	3*n*	Δ
1880.40	190.7	10.98	1*n*	β
1905.66	191.3	11.26	1*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Bl (**V**) ... Δ (**II**) ... Cin^{5} ... β^{3} ... Glasenapp (**V**) ... β^{6} ...]

39 6 **8766.** 28 *Sagittarii.* **See** 360. Later measures are:

1899.71	209°3	12″00	2*n*	Cg	... 14.3
1900.47	209.5	12.19	1*n*	β	... 13.5

[See (*A. J.* 431) ... Cogshall (*A. J.* 486) ... β^{6} ...]

39 6 **8767.** **Σ 2376.** Fixed.

1866.75	63°9	22″18	3*n*	Δ
1895.54	63.0	22.31	2*n*	Gla

[Ma (*F. S.* **II**) ... Bl (**V**) ... Δ (**II**) ... Cin^{5} ... Glasenapp (**IV**) ... *Annals Toulouse Obsy.* **III** ...]

39 12 **8770.** **A** 253. No other measures.

[A (3784) (*Bul. L. O.* No. 16) ...]

8771. **Σ 2373.** (= **Sh** 274.) Fixed. 39^m 13^s

1868.17	336°8	4″04	4*n*	Δ
1889.58	337.9	3.98	4*n*	Giacomelli
1900.53	336.9	4.21	3*n*	Doo

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Mh ... Se ... Bp ... Se^{3} ... Ra (**XXIII**) ... Δ (*Mem. Accad. Sci.*) ... Δ (1036, 1116) ... Δ (**I, II**) ... Ba (**II**) ... Giacomelli (**III**) ... WS^{2} .... Cin^{5} .... Doolittle (*Pub. Flower Obsy.* **I**) .... Glasenapp (**I, II, III**) ... Ho (3558) ... *Annals Toulouse Obsy.* **III** ... Scott (*Mon. Not.* **LXIV**, 52) ... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

8773. **Hu** —. Discovered by Hussey, but not included in his printed catalogues to this time. 39 15

8774. **Ho** 568. The only other measures are: 39 18

1902.58	172°2	4″60	3*n*	Doo

[Ho (3557) ...]

8775. **Σ 2380.** *Lyrae* 56. Fixed. 39 24

1865.92	9°9	25″85	3*n*	Δ
1902.63	9.3	25.74	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Ra (**XXV**) ... Δ (1209) ... Δ (**I, II**) ... Glasenapp **III, IV**) ... *Annals Toulouse Obsy.* **III** ... Coleman (*Mem. R. A. S.* **LIV**) ...]

(See p. 1080)

8776. **Σ 2375.** No change in distance, and but little, if any, in the angle. 39 34

1867.05	112°9	2″16	4*n*	Δ
1879.76	113.7	2.23	7*n*	Sp
1885.72	114.5	2.20	3*n*	Hl
1887.21	113.2	2.25	2*n*	HΣ
1898.76	115.3	2.16	3*n*	A
1901.60	113.7	2.37	2*n*	Bowyer
1902.97	113.7	1.89	6*n*	Furner

[Ma (*F. S.* **I**) ... Ma (**IX, X, XI, XIII, XV**) ... H^{1} ... H^{2} ... H (**V**) ... Da^{1} ... Da^{2} ... Da^{3} ... Se ... Se^{2} ... Wr ... Ra (**XXV**) ... Flm ... Ferr ... Nobile (*R. della Accad. Sci.*, Nov. 1875) ... Δ (*Mem. Accad. Sci.*) ... Δ (1032) ... Δ (**I, II**) ... Du ... Sk^{2} ... Lv^{1} ... Je (2449, 2772) ... Hayn (3051) ... Sp (**II**) ... de Ball (2753) ... T (2898, 2991) ... β^{3} ... Glasenapp (**I, II, III**) ... Hl (*Wash. Obsns.* 1882, 1885) ... Hl (**II**) ... Maw (**I**) ... Collins (*A. J.* 378) ... Knorre (3518) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXII**, 383; **LXIII**, 403; **LXIV**, 803) ... A (3585) ... *A. G. Leipzig*, p. 249 .... Solá (3679) .... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**) ...]

8778. **OΣ (App)** 172. Unchanged. There is a faint star nearly midway between A and B. 40 8

1880.41	6°3	65″29	1*n*	β
1905.67	5.6	65.38	2*n*	β

[Δ (**I**) ... β^{3} ... Franz (3080) ... β^{6} ...]

8779. 5 *Aquilae.* **Σ 2379.** (= **𝕳 III. 33** = **𝕳 N.** 9 = **Sh** 275.) Without change. The faint star is not in Σ. The principal star has a proper motion of 0″034 in 192°8 (Auwers). 40 17

1866.28	122°1	13″02	3*n*	Δ
1880.02	121.3	13.05	2*n*	β
1889.55	120.6	13.00	4*n*	Giacomelli
1903.64	121.0	12.92	5*n*	Jouffray

[Ma (**XI, XIII**)....Ma (324)....Ma (*F. S.* **I**).... Ma (*Beiträge zur physischen Kenntniss*, Weimar, 1841)... Mh... H¹... Da¹... *Wash. Obsns.* 1862... Se¹ ...Se³...Ra (**XXI, XXXVIII, XXXIX**)...Gl...Δ (1194)...Δ (**I, II**)...Cin⁴... Cin⁵...β³...Giacomelli (**III**)...Glasenapp (**I, II, III**)...Solá (3529)...*Annals Toulouse Obsy.* **III**...Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

40m 18s **8780.** **H 1342.** Nothing later but the following:

1902.65	185°7	18″80	1*n*	Es	9.0...12
1905.75	185.8	18.66	1*n*	β	9.0...12

The principal star is DM (43°) 3055.

[Espin (*Mon. Not.* **LXIV**, 679)...β⁶...]

40 18 **8781.** 46 *Draconis*. **H VI. 37.** (= σ 590.) There are two large stars perhaps 5′ distant, one of them doubtless being the star referred to by H. There are several small stars in the field nearer (1876). The meridian positions give the relation of these stars:

1852	341°4	333″90	Rad¹
1869.7	341.1	333.67	*A. G. Hels.*

The proper motion of 46 *Draconis* is 0″041 in 295°7 (Auwers).

40 22 **8782.** ε¹ **and** ε² *Lyrae*. **Σ 37, App. I.** The principal stars of the well-known quadruple. This wide pair is readily seen with the naked eye. No material change in either angle or distance.

1857.76	172°7	207″72	1*n*	OΣ
1866.27	172.8	207.52	12*n*	Δ
1881.37	172.8	207.76	1*n*	OΣ
1886.56	172.7	207.59	2*n*	Per
1903.25	172.7	207.59	2*n*	Do

The proper motions are given by Auwers:

ε¹ *Lyrae* = 0″060 in 1°1
ε² *Lyrae* = 0.061 in 1.0

Dembowski measures the 9.4 m star, DM (39°) 3512, from the principal star of both pairs.

From ε¹ (A)	1863.43	134°8	145″44	2*n*	Δ
	1905.69	135.2	146.40	2*n*	β
From ε² (A)	1863.43	36.7	129.09	2*n*	Δ
	1905.69	36.2	127.12	2*n*	β

[Ma (**X**)...Mu...Ra (**XXVI**)...En (1518, 1674)...Δ (1474)...Δ (**II**)...Maiebckato (*Obsns.* 1892)... Lu (**III**)...WS... Pk... Pt... Hd ...Flm ...β²... Bl (**V**)... Per... Je (2340)... Franz (2590) ... OΣ (**X**) ... Maw (**I**)... Do (3931)... Biesbroeck...β⁶...]

See references to Nos. 8783 and 8785.

40 22 **8783.** ε¹ *Lyrae*. **Σ 2382.** (= **H II. 5 = Sh 276.**) Probably a physical system. Slow retrograde motion in angle, the distance remaining constant. A vast amount of time has been practically wasted in duplicating measures of this and Σ 2383.

1841.14	22°7	3″48	5*n*	OΣ
1856.51	19.0	3.24	7*n*	OΣ
1866.37	19.0	3.04	14*n*	Δ
1877.43	16.1	3.07	4*n*	Hl
1888.61	14.8	3.07	4*n*	Hl
1896.71	14.3	3.12	3*n*	Hu
1903.10	12.4	3.20	4*n*	Do

[Ma (*F. S.* **I**)... Ma (303)...Ma (**IX, X, XI, XIII, XV**)...Bes...Ek (**I, II**) ...BM (280)... H¹...H²... H (**IV, V**)... Mh ... K (409, 1519)... K... Bp ...Wr... Da¹ ... Da²...Da³ ...Da⁴... J²... Fl... P¹... Auwers (1393)...Se (1017)... Se...Se²...Se³... Lu (1103)... Lu (**I, II, III**) ... Wh ... Hd... Pogson (*Brit. Ass'n Rep.* 1858)...Ra (**XXI, XXVI–XXX, XXXII–XXXV, XXXVIII, XLVI**) ...Pt...Pk...Pl...Flm ...Bru... Ba (**II**)... Du...WS...WS²... Gl... Sk... Sk³... Cooper (2155)... En (1518, 1674)... Sp (2133)... Sp (**II**)... OΣ (**IX**)... Δ (*Mem. Accad. Sci.*) .... Δ (1032, 1036, 1116, 1474) .... Δ (**I, II**) .... Do (2199, 2242, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13) ... Goldney (2257) ... Giacomelli (**III**) ... Per ... Per (2529) ... Je (2407, 2772) ... Kustner (2584) ... de Ball (2753) called Σ 2383 ... Franz (2590)... Hl (*Wash. Obsns.* 1883, 1886) .... Hl (**I, II**) .... See (*Beob. Berlin*, No. 6, 1892) .... Searle (*A. J.* 299) .... Glasenapp (**I, II, III, IV, V**)...Maw (**I, IV**)...Big (*Bul. Ast.* **XII**, 299)...Cohn (3240)...Knorre (3300)...Schwarzschild (3335)...See (*A. J.* 359)...Hu (*A. J.* 397)...Morgan (*A. J.* 439)...Greenwich Obsy. (*Mon. Not.* **LX**, 519)...Gl (*Mon. Not.* **LXI**, 556)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Biesbroeck...]

8784. **Sh 277.** A group of faint stars between ε¹ and ε² *Lyrae*, the two brighter, AB, make Sh 277. Sh gave 50° ±: 53″ ± (1823.82). The fainter stars, C and D, are frequently mentioned as light tests for small apertures. Other stars near, besides those measured. 40m 23s

AB	1904.95	37°9	46″01	2*n*	β
CD	1904.45	353.5	26.40	1*n*	β
AC	1904.95	245.0	43.64	2*n*	β

[H (**IV, V**).... Δ (**II**, p. 581).... Lassell (*Mon. Not.* **XVII**, 64)....WS.... Wilson (*Mon. Not.* **XXXIV**, 127)...Hl (*Observatory* **IV**, 281; **V**, 290)...Gl (*Observatory* **III**, 508, 540, 637).... Terby (*Observatory* **IX**, 396) .... Gl (*Ast. Reg.* **XVIII**, 256) ... Flm ... Common (*Observatory* **IV**, 20) ... Big (*Bul. Ast.* **XII**, 299)...β¹...β⁶...]

See references to Nos. 8783 and 8785.

8785. ε² *Lyrae*. **Σ 2383.** (= **H II. 6 = Sh 278.**) Slow retrograde motion; similar to ε¹ *Lyrae*. 40 24

1841.30	151°1	2″67	4*n*	OΣ
1852.30	147.7	2.64	2*n*	OΣ
1858.20	144.4	2.50	5*n*	OΣ
1864.39	143.8	2.44	11*n*	Δ
1877.43	137.5	2.45	4*n*	Hl
1888.61	133.0	2.30	4*n*	Hl
1890.54	132.5	2.37	6*n*	Giacomelli
1903.10	126.7	2.41	4*n*	Do

[Ma (303)...Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)...H¹...H²...H (**IV, V**)... Mh... BM (280)... Ek (**I**) ... K... K (409, 1519)... Bp ... Fl... Bes... Wr... Da¹...Da²...Da³... Da⁴...P¹...J²... Wh... Miller (806)...Auwers (1393) ...Bond (*Am. Acad.* **II**, 144)...Se (1017)...Se ...Se²...Se³...Du ...Bru... Hd...Lu (**II, III**)... Flm... Δ (*Mem. Accad. Sci.*)... Δ (1032, 1116, 1474)... Δ (**I, II**) ... OΣ (**IX**) ... Ra (**XXI, XXVI–XXXVI, XXXIX, XLVI**) ... Ba (**II, IV**)...Cooper (2155)... En (1518, 1674)...Bl (**V**)... Pl...WS...WS²...Gl... Sk...Pk...Pt...Big...Do (2199, 2242, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (2133)...Sp (**II**) ... Goldney (2257)...Per...Per (2529)...Giacomelli (**III**)...Je (2407, 2772)...Kustner (2584)...Franz (2590)...Hl (*Wash. Obsns.* 1883, 1886)...Hl (**I, II**)...β (*Mon. Not.* **LI**, 391)... de Ball (2753) called Σ 2398 ...See (*Beob. Berlin*, No. 6, 1892)... Glasenapp (**I, II, III, IV, V**)... Maw (**I, IV**)...Cohn (3240)...Knorre (3300)...Schwarzschild (3335)...See (*A. J.* 359)... Searle (*A. J.* 299)... Hu (*A. J.* 397) ... Morgan (*A. J.* 439) ... Big (*Bul. Ast.* **XII**, 299)...Greenwich Obsy. (*Mon. Not.* **LX**, 519)...Gl (*Mon. Not.* **LXI**, 556) ...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Biesbroeck...Lau (4054)...]

8786. 110 *Herculis*. (AC = **H 2839.**) The faint star between was added with the 18½-inch. For AC H gives, 108°9 : 60″ ± : 5–6...15 (1830+). The principal star has a proper motion: 40 30

Auwers	0″334 in 185°8
A. G. Berlin	0.350 in 186.9

The 40-inch shows two nearer stars.

A*a*	1900.48	197°4	23″70	1*n*	*β*	...14.0
A*b*	1900.48	28.0	27.07	1*n*	*β*	...13.7
AB	1900.48	86.7	45.68	1*n*	*β*	...12.5
AC	1900.48	85.6	61.24	1*n*	*β*	...11.0

[β3...Cin5...Pk...Big (*Bul. Ast.* **XII**, 299)...β6...]

40^m 38^s **8788.** *ζ Lyrae.* **β 968.** (AD = **♅ V. 2 = Sh 279 = Σ 38, App. I = OΣ (App) 173.**) The small stars, C and E, were discovered with the 18½-inch, and subsequently a still fainter and nearer companion was detected with the 36-inch.

There is no suggestion of motion in the old companion since the measures of Struve in 1835. Auwers gives the proper motions of these stars:

A = 0″027 in 37°1
D = 0.029 in 23.8

The measures indicate a common proper motion. It will have to be determined hereafter whether or not the faint stars share in this movement.

A and B

1898.63	50°7	27″04	3*n*	A	...14.7

A and C

1898.63	273°1	45″55	3*n*	A	...14.0

A and D (= Σ 38 App. 1)

1835.23	149°7	43″71	5*n*	Σ
1840.71	150.0	43.79	3*n*	OΣ
1868.20	149.6	43.69	6*n*	Δ
1878.23	149.6	44.11	10*n*	Je
1880.49	149.6	43.48	2*n*	*β*
1889.43	149.3	43.73	2*n*	*β*
1904.81	150.4	43.74	1*n*	Lau

A and E

1898.63	302°8	61″79	3*n*	A	...13.0

The principal star is supposed to be a spectroscopic binary, discovered by Curtis (*Bul. L. O.* No. 70).

[β (**III**)...β3...β (2957)(*Pub. L. O.* **II**)(*Observatory* **IV**, 18)...A (3585)...]

A few only of the measures of AD are given. All will be found in the following references:

[OΣ (**X**)...Δ (**II**)...Da8...H1...Pl...Ra (**XXI, XXV, XXVII, XXXV, XXXVIII**) ...Hl (*Wash. Obsns.* 1886)(**II**)...Hunt (*Observatory* **III**, 605)...Je (2340)... Bl (**V**)...T (2866)...Franz (3080)...Maiebckato (*Double Star Measures* 1892) ...Glasenapp (**II, III, IV**)...Lau (4054) (*Bul. Ast.* **XXII**, 238)...]

40 46 **8789.** **Σ 2381.** Fixed.

1865.87	122°9	8″50	3*n*	Δ
1879.33	124.2	9.42	1*n*	Cin
1905.72	122.6	8.46	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...β6...]

40 58 **8790.** **Σ 2386** *rej.* The only measures are:

1904.60	18°1	20″43	2*n*	Es	8.7...9.2
1905.66	20.5	21.32	1*n*	*β*6	8.2...8.3

8791. **H 2838.** "Large star fine orange." In O. Arg. S. 6-7 m. 41^m 3^s

1879.46	334°4	34″73	1*n*	Cin5	6.5. .11.0
1905.41	333.4	33.51	1*n*	*β*6	7.0...11.0

8792. **Σ 2393.** (= **♅ III. 81.**) Change from proper motion. All the measures are given. 41 6

1783.20	23°7	9″45	1*n*	♅
1829.68	22.5	10.42	3*n*	Σ
1843.76	22.3	11.07	1*n*	Ma
1865.61	23.1	11.78	4*n*	Δ
1896.47	24.4	13.38	2*n*	Lv
1896.52	22.8	13.51	5*n*	Soulé
1900.36	22.7	13.56	7*n*	Espin
1905.41	22.9	13.31	3*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Flm...Δ (1573) ..Bl (**V**)...Lv (*A. J.* 407) ...Soulé (*A. J.* 410)...Espin (*Mon. Not.* **LXII**, 530)...β6...] (See p. 1080)

8794. **Σ 2392.** No material change. 41 10

A and B

1868.12	315°5	2″83	5*n*	Δ
1905.42	316.9	2.67	3*n*	*β*

A and C

1868.26	177°2	23″35	4*n*	Δ
1905.39	176.3	23.48	2*n*	*β*

[Ma (*F. S.* **I**, 36, 58)...Ma (**XI, XIII**)...Δ (**II**)...Cin5...β6...]

8795. **Σ 2385.** Without change. A distant star in Ma (XI). The principal star has a proper motion of 0″076 in 13°1 (*A. G. Berlin*). 41 12

1866.57	38°8	4″50	3*n*	Δ
1904.46	36.0	4.80	1*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β6...]

8796. **Espin 22.** (AC = **H 1346.**) The nearest companion discovered by Espin. 41 12

AB	1901.29	132°0	2″94	3*n*	*β*	8.9...12.5
AC	1880.49	216.6	14.69	1*n*	Big	
	1880.51	216.2	23.83	1*n*	Big	
	1900.62	215.9	24.70	1*n*	Es	...10.8
	1901.29	216.4	24.37	3*n*	*β*	... 9.9

The first distance by Bigourdan is probably a misprint for 24″69.

[Big...Espin (3717)...β5...]

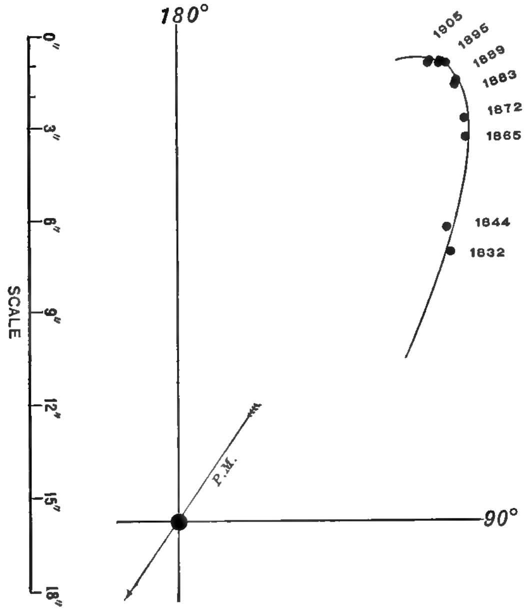
8797. **Σ 2390.** (= **♅ II. 67 = S 705.**) Fixed. The measure in Ma (XI) probably belongs to Σ 2394. 41 29

1868.25	156°3	4″20	4*n*	Δ
1904.45	157.9	4.25	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H1...H (**IV**)...Se...Ma (324)...Δ (**II**)... Bl (V)...T (2898)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

$41^m 34^s$ **8798.** **Σ 2398.** For nearly half a century this appeared to be a double of the 61 *Cygni* class, both stars having a large but slightly different proper motion. In the last twenty years the change in angle and distance has been very slow, and it is pretty certain that the maximum separation has been reached, and that the distance is now slowly diminishing. Nothing can be inferred as to the period until the companion is at its greatest distance from the primary in the fourth quadrant, and that is likely to be more than a century hence. The system has a large proper motion:

Stumpe	2″.303 in 325°.4
Porter	2.286 in 324.5
Kustner	2.289 in 325.4
Krueger	2.299 in 325.6



Σ 2398.

The parallax of the principal star has been measured by Lamp, who found 0″.353, and by Schlesinger (photographic) 0″.29.

1832.17	134°.4	12″.42	3*n*	Σ
1844.91	137.3	12.97	1*n*	Ma
1865.67	142.9	15.57	4*n*	Δ
1872.62	144.3	16.08	2*n*	Δ
1883.69	147.3	16.78	5*n*	En
1889.55	147.4	16.94	3*n*	Hl
1895.63	149.4	17.28	2*n*	Collins
1897.57	150.1	17.29	2*n*	Gla
1898.42	150.0	17.16	4*n*	Doo
1904.57	151.1	17.01	3*n*	β
1905.52	151.0	17.06	3*n*	β

[Ma (*F. S.* **II**)...Ma (**XI**)...H (**V**)...Flm...Δ (1573)...Δ (**II**)...Sk²...En (2677) ... Hl (**II**) ... Lamp (2676, 2807) parallax ... Collins (*A. J.* 378) ... Glasenapp (**V**)...Doolittle (*Pub. Flower Obsy.* **I**)...β⁶...]

8799. **Σ 2395.** No change. $41^m 38^s$

1866.35	308°.7	8″.42	3*n*	Δ
1905.54	309.2	8.32	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Cin⁵...β⁶...]

8800. **β 465.** Discovered with the 6-inch. Fixed. 41 39

1891.59	295°.4	3″.12	3*n*	β	8.4...10.5
1895.64	292.8	3.13	3*n*	A	8.1...10.4
1903.05	291.3	3.20	6*n*	Doo	8.6...10.2

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β (3114) (*Pub. L. O.* **II**)...A (*A. S. P.* **VII**, 305)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8801. **Σ 2394.** Fixed. 41 41

1866.59	201°.6	6″.62	3*n*	Δ
1895.63	202.6	6.83	2*n*	Gla
1903.54	200.5	6.75	3*n*	β

[Ma (*F. S.* **II**)...Ma (**XI, XIII, XV**)...H¹...Se...WS...WS²...Gl...Δ (**II**)... Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...β⁶...]

8802. **H 1344.** Nothing since H but the following: 41 41

1893.55	206°.8	13″.04	2*n*	Big
1905.70	206.8	13.20	1*n*	β

[Big (*Bul. Ast.* **XII**, 299)...β⁶...]

8804. **β 51.** Unimportant triple a short distance *f* ε *Lyrae;* noted with the 6-inch. 41 42

1905.49	297°.3	6″.14	4*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...Doolittle (*Pub. Flower Obsy.* **I**)...]

8805. **A 254.** No other measures. 41 54

[A (3784) (*Bul. L. O.* No. 16)...]

8806. **Hu 755.** With two later measures the mean is: 41 58

1904.48	118°.1	0″.64	3*n*	Hu	8.6...9.2

[Hu (*Bul. L. O.* No. 65)...]

8809. **Σ 2389** *rej.* The only observations are: 42 9

1823	300° ±	18″ ±	1*n*	H (VII)	10 ...11.12
1904.46	303.1	30.69	2*n*	β⁶	8.4...10.7

8810. **Σ 2391.** (= ♅ **VI. 49.**) Fixed. 42 14

1867.15	332°.5	37″.75	4*n*	Δ
1890.51	332.0	37.90	2*n*	Gla

[Ma (*F. S.* **II**)...Ma (**XI, XIII**)...Mh...Hl (*Wash. Obsns.* 1863)...Hl (**I**, p. 134) ...Δ (**II**)...Je (2407)...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...]

8812. **OΣ (App) 174.** The later measures show no sensible change. 42 17

1903.54	159°.7	105″.58	3*n*	β

[Δ (**I**)...β⁶...]

42^m 26^s **8815.** **Σ** 2388 *rej.* The only measures are:

AB	1905.34	344°8	53″69	2*n*	β^6	8.0...
BC	1905.34	20.5	21.37	2*n*	β^6	10.2...10.3

42 30 **8817.** **H** 1347. Unchanged.

AB	1873.49	275°0	18″43	1*n*	Δ	8.0...8.5
	1904.45	275.3	18.47	1*n*	β	
AC	1873.49	164.1	75.31	1*n*	Δ	...8.2
	1904.45	164.0	75.25	1*n*	β	

[Δ (**I**)...β^6...]

42 34 **8818.** 29 *Sagittarii.* **See 362.**

1899.60	1°6	17″80	3*n*	Cg	6.3...13.7

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

42 34 **8819.** **OΣ** 362. (= **OΣ** 546.) Unchanged.

1866.61	338°5	7″69	3*n*	Δ
1898.46	340.5	7.90	4*n*	Hu

Hussey measures a 13.5 m companion not previously seen:

1898.70	102°8	11″55	1*n*	Hu

[**OΣ** (**IX**, pp. 357, 412)...Δ (**I**)...Hu (*Pub. L. O.* **V**, pp. 151, 215)...]

42 36 **8820.** **Ho** 439. Change, or distance in Ho too small. These are all the measures:

1891.73	152°7	2″71	2*n*	Ho
1900.56	150.9	4.05	4*n*	Doo
1903.37	151.8	4.34	2*n*	β
1904.42	150.3	4.13	3*n*	Doo

[Ho (3234)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

42 39 **8822.** **Σ** 2397. Unchanged.

1867.56	267°9	3″83	4*n*	Δ
1895.61	263.7	3.93	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se ... Du ... Ferr ... Bl (**V**) ... Δ (**II**) ... Glasenapp (**IV**)...]

42 49 **8823.** **Howe** 44. (= **Hn** 147.) Discovered by Howe.

1888.75	295°6	1″81	2*n*	Com	9.2...10.9

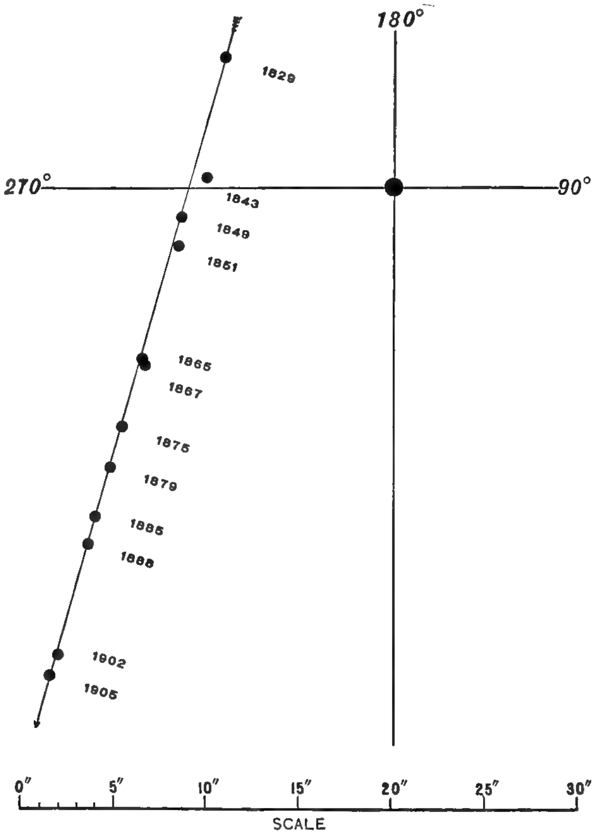
[Cin^5...*Pub. Washburn Obsy.* **II**...Com (**VI**)...]

42 49 **8824.** **Σ** 2396. An optical pair, and interesting only from the large proper motion of the principal star. This movement is given:

Argelander	0″468 in 165°2
Stumpe	0.448 in 164.9
Porter	0.451 in 162.7
Paris	0.487 in 157.4
Measures Σ—β	0.463 in 164.8

The following measures are shown on the diagram:

1829.60	232°8	11″74	3*n*	Σ
1843.71	267.4	10.31	2*n*	Ma
1849.09	278.2	11.71	3*n*	OΣ
1851.91	285.4	12.28	2*n*	OΣ
1865.76	304.7	16.64	2*n*	OΣ
1867.66	305.7	16.80	1*n*	Δ
1875.43	311.8	19.87	1*n*	Δ
1879.62	315.0	21.87	2*n*	Hl
1885.66	318.2	24.29	3*n*	Hl
1888.74	319.8	25.60	3*n*	T
1902.44	324.8	31.38	2*n*	Hu
1905.26	325.2	32.50	3*n*	β



Σ 2396.

[Σ (*Pos. Med.* cccxxx) ... **Ma** (*F. S.* **I**) ... Ma (**XI**) ... OΣ (**IX**) ... Wn (**V**) ... Wn (1738)...Flm...Hd...Δ (1573)...Δ (**II**)...WS...WS^2... Sk...Sk^3...Sp (**II**) ... T (2991) ... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... Engelhardt (**III**) ... *A. G. Leipzig*, p. 210...Biesbroeck...β^6...]

8825. **Σ** 2403. *Draconis* 203. B. A. C. 6410. Without change. The components appear to have a small common proper motion, 0″017 in 305°8 (Battermann). 42^m 53^s

1867.16	258°5	1″54	5*n*	Δ
1895.56	261.5	1.79	2*n*	Gla
1902.45	262.0	1.61	4*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII**)...H^1...H (**V**)...Bp...Da^2... Da^3...Se...Bl (**V**) ...Δ (1125, 1194)...Δ (**I, II**)...Glasenapp (**IV**)...]

43^{m} :5 **8826.** **Hall.** From Hl (I). Place approximate. Undoubtedly this is Σ 2402.

43 15 **8827.** **H̤ VI. 50.** No measures in H̤. The faint star, B, was added by me with the 6-inch. C is SD (6°) 4923. The only other measures are:

AB	1901.44	360°3	23″21	3*n*	β	6.4...12.5
AC	1901.44	170.8	113.75	3*n*	β	... 8.0

[β8...β6...]

43 15 **8828.** **OΣ 363.** Unchanged.

1878.40	22°6	0″40	9*n*	Hl
1898.78	29.8	0.35	4*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX, X**) ... Δ (**I**, pp. 189, 392) ... Big... En (2662)... Cin5 ...Hl (**I**, pp. 20, 26)...Glasenapp (**III**)...Com (**X**)...Brown (3646)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

43 28 **8829.** **A 255.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

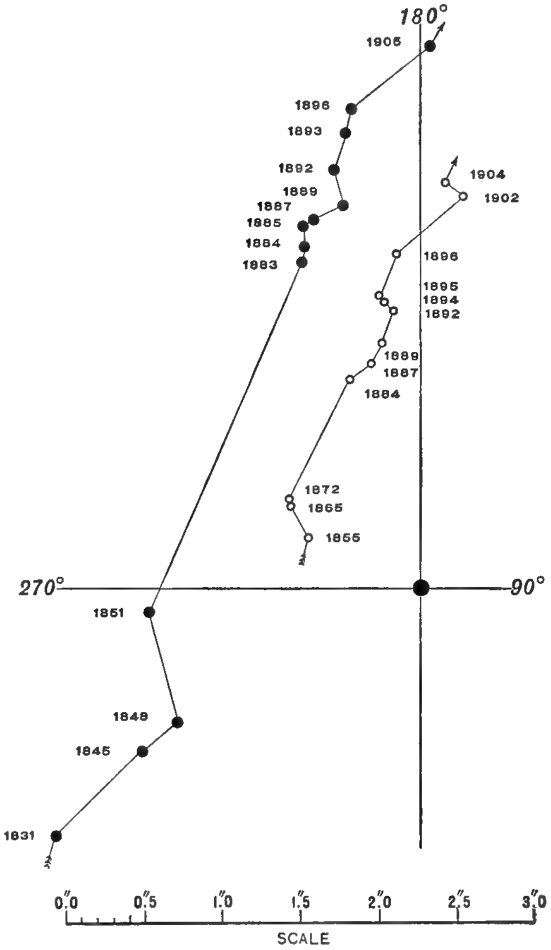
43 32 **8830.** **Σ 2400.** The duplicity of the companion was discovered by Perrotin in 1883, but it had been previously seen by OΣ, and measured as the Σ companion, the latter for some reason not being seen. On several occasions, 1854–58, OΣ could not see any companion. The two faint stars, 1889–92, were very nearly the same magnitude, and there is no evidence of any relative change in their positions with reference to each other, so that unless one is variable, it is difficult to explain the failures to see B whenever the other was visible. The change in the position of BC from A is due to the proper motion of the latter, which is about 0″076 in the direction of 337°2. Many of the measures are very uncertain and inconsistent. There is an error of 10° in the printed angle of my measure of AC in 1892 (*Pub. L. O.* II). It should be 191°9 as given here.

A and C

1831.16	304°2	2″85	4*n*	Σ
1845.08	300.5	2.09	2*n*	Ma
1848.45	299.0	1.80	1*n*	Ma
1851.62	275.3	1.77	1*n*	OΣ
1883.61	198.9	2.39	4*n*	Per
1883.77	201.6	2.11	3*n*	Hl
1884.56	198.8	2.49	2*n*	Per
1884.62	199.2	2.20	3*n*	Hl
1885.62	198.1	2.47	3*n*	Hl
1887.64	196.5	2.49	1*n*	HΣ
1889.47	191.7	2.54	4*n*	β
1892.42	191.9	2.78	1*n*	β
1893.58	189.4	3.00	1*n*	Big
1896.54	188.3	3.15	3*n*	A
1905.68	179.2	3.53	2*n*	β

A and B

1855.67	246° ±	0″8 ±	1*n*	OΣ
1865.72	238 ±	1 ±	1*n*	OΣ
1872.61	236.3	1.02	1*n*	OΣ
1884.56	198°9	1″43	2*n*	Per
1887.64	192.4	1.49	1*n*	HΣ
1889.47	189.0	1.61	4*n*	β
1892.42	187.2	1.87	2*n*	β
1894.73	185.7	1.81	1*n*	Com
1895.67	188.0	1.91	3*n*	Lewis
1896.54	184.2	2.17	3*n*	A
1902.67	173.8	2.56	2*n*	Hu
1904.38	176.6	2.64	1*n*	β



Σ 2400.

There is no change in the relation of the small stars.

B and C

1889.48	197°5	0″81	2*n*	β
1892.42	199.8	0.65	2*n*	β
1894.73	198.1	0.79	1*n*	Com
1896.54	197.2	0.94	3*n*	A
1902.67	203.2	0.99	2*n*	Hu
1904.38	197.0	0.71	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...OΣ (**IX**)...Δ (1736)...Flm...WS...Sk2... Big....Sadler (*Eng. Mech.* **XXXVIII**, 217)....Hl (*Wash. Obsns.* 1883–85) .... Hl (**II**).... Ho (2978).... Per....Per (2559).... β (*Observatory* **XII**, 342) ... β (2957, 3142) (*Pub. L. O.* **II**) ... Big (*Bul. Ast.* **XII**, 299) ... Com (**X**) ... A (3396)... HΣ (**XII**) ... Sk5 ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIV**, 803)...β6...]

$43^m\ 34^s$ **8831.** **H 867.** "Delicate."

1902.43	313°.4	10″.19	1*n*	β^6	11.0...11.5

43 35 **8832.** **Σ 2399.** Unchanged. Σ alludes to a fourth star, which in Ma (XI) is measured from B, 71°.3 : 39″.88 (1843.61) 1*n*.

A and B

1867.13	118°.7	15″.77	3*n*	Δ
1902.45	118.8	15.30	1*n*	Hu

A and C

1867.13	49°.1	32″.63	3*n*	Δ
1902.45	48.8	32.51	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...*A. G. Leipzig*, p. 210...]

43 38 **8833.** 30 *Sagittarii.* **β 1300.** No other measures. The proper motion of the principal star is small, 0″.075 in 260°.0.

[β^5...]

43 43 **8835.** **Hu 756.** With two other measures the mean is:

1904.48	250°.8	1″.13	3*n*	Hu	8.6...12.1

[Hu (*Bul. L. O.* No. 65)...]

43 49 **8836.** **Σ 2401.** Fixed.

1868.11	40°.0	3″.98	4*n*	Δ
1901.99	39.0	4.37	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)...Ma (**X**)...H (**V**)...Se...Wr...Δ (**I, II**)...Δ (1125, 1194)...T (2991)...Glasenapp (**III, IV**)...]

43 49 **8837.** **β 969.** Discovered with the 18½-inch. Probably fixed. The principal star is No. 219 of *Schjellerup's Catalogue of Red Stars.*

1892.38	238°.0	14″.11	1*n*	β
1892.56	238.3	14.79	2*n*	Lv
1898.70	237.6	14.26	3*n*	Cogshall

[β (**XIII**) ...β^3...β (3142) (*Pub. L. O.* **II**) ... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892)... Cogshall (*A. J.* 478)...]

43 56 **8839.** **Hn 148.** No change.

1900.64	19°.7	3″.75	2*n*	Hu	8.5...12.5

[*Pub. Washburn Obsy.* **II**...Com (**VI**)...Hu (*Bul. L. O.* No. 44)...]

44 0 **8841.** **G. Anderson 6.** From Hl (I, II); discovered by Geo. Anderson with the 26-inch. This may be Σ 2408.

44 0 **8842.** **H 868.** "A beautiful little double star in the field with a remarkably red star 9 m." The red star referred to is β 969 (No. 8837). H 868 is a wide pair of small stars.

1905.51	90°.7	9″.85	1*n*	β^6	10...11

8843. **H 2842.** The following is the only measure: $44^m\ 3^s$

1890.55	338°.8	28″.21	2*n*	Gla	8.0...9.0

[Glasenapp (I)...]

8844. **Σ 2402.** The measures of the angle are very contradictory; probably very little change, if any at all. 44 5

1830.20	197°.7	0″.74	4*n*	Σ
1843.65	208.4	0.68	3*n*	Ma
1849.08	215.3	0.93	4*n*	OΣ
1856.64	213.4	0.90	2*n*	Se
1858.73	217.9	0.6±	4*n*	Ma
1868.94	202.5	0.90	4*n*	Δ
1875.67	206.6	0.94	3*n*	Sp
1883.95	212.6	1.10	7*n*	En
1884.57	204.8	1.08	3*n*	Per
1884.62	204.8	1.11	3*n*	Hl
1893.70	212.6	1.06	2*n*	Gla
1895.63	205.3	0.92	2*n*	Collins
1899.50	206.0	0.81	4*n*	Bowyer
1903.53	206.8	1.31	3*n*	Do
1903.98	204.5	1.04	2*n*	Biesbroeck

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Se (*Comp. Rend.* **XLVIII**, 375) ... Se ... Se^2...OΣ (**IX**)...Δ (**II**)...Flm...WS...WS^2...Gl...Sk...Newcomb (*Wash. Obsns.* 1874)...Big...En (2677) ... Sp (2133) ... Sp (**II**) ... Hl (*Wash. Obsns.* 1884)...Hl (**I, II**) ... Per... Per (2559, 2685) ... T (2991)... Glasenapp (**III**)... Big (*Bul. Ast.* **XII**, 299)... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803).... Collins (*A. J.* 378) ...Sk^5...Do (3931)...Biesbroeck...]

8445. **H 5070.** "Duplex" in O. Arg. S. 44 6

1877.48	51°.5	9″.75	2*n*	Cin	8.7...8.7
1890.51	51.2	9.35	2*n*	Gla	8.3...8.4

[Cin^4...Glasenapp (**I**)...]

8846. **β 970.** Discovered with the 18½-inch. In SD 8.8 m. It is closely *f* β 969. 44 15

The other measures are:

1892.38	107°.9	1″.54	1*n*	β
1898.72	106.8	1.44	3*n*	Cogshall
1901.57	107.7	1.51	3*n*	Doo

[β (**XIII**)....β^3....β (3142) (*Pub. L. O.* **II**).... Cogshall (*A. J.* 478).... Doolittle (*Pub. Flower Obsy.* **II**)...]

8847. **H 1349.** "Distance and magnitudes est. from diagram." 44 24

1903.35	82°.8	22″.43	2*n*	β^6	8.4...10.6

8848. **H 1351.** The only measures are: 44 24

AB	1905.33	353°.3	23″.35	1*n*	β^6	9.5...10.5
BC	1905.33	310.6	10.36	1*n*	β^6	...11.3

8849. **β 971.** *Draconis* 205. B. A. C. 6421. Discovered with the 18½-inch. It is certainly a binary, and in rapid motion. In 1891 it had become a difficult pair with the 36-inch, and appeared to be rapidly closing. The difference in magnitude of the components makes it a much more difficult 44 24 pair than it would at first seem to be. The measures indicate that the plane of the orbit is nearly in the line of sight. The period will probably be short.

1879.39	350°.1	....	1*n*	Cin	8.0...8.0
1879.88	354.7	0″.54	2*n*	β	6.5...8.5
1891.48	364.5	0.36	3*n*	β	6.8...9.2
1893.54	107.0	0.25±	2*n*	Lv	
1894.61	Single, 36-in.		2*n*	Barnard	
1897.43	11.6	0.30	1*n*	Lewis	
1898.70	5.2	0.36	1*n*	A	6.5...9.0
1899.71	19.8	0.36	1*n*	A	
1899.73	10.4	0.31	1*n*	Doo	
1900.73	8.3	0.27	1*n*	Bryant	
1900.75	8.0	0.37	1*n*	A	
1902.31	29.3	0.34	1*n*	A	
1904.40	Single, 36-in.		1*n*	Hu	
1904.44	Single, 36-in.		1*n*	A	
1905.29	36.6	0.37	1*n*	A	
1905.54	Not seen, 36 in.		3*n*	A	

[β (**XIII**) ... $β^3$ ... β (3114) (*Pub. L. O.* **II**) ... Cin^5 ... Lv (*A. J.* 382) ... Barnard (*A. J.* 447) ... Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LXI**, 486) ... A (3639) (*Bul. L. O.* No. 11) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

(See p. 1080)

$44^m\ 38^s$ **8852.** **β 265.** Discovered with the 9.4-inch at the Dartmouth College Observatory. The measures show no motion.

1879.55	235°.1	1″.36	2*n*	OΣ
1881.60	232.4	1.34	3*n*	β
1884.61	227.8	1.40	2*n*	HΣ
1885.55	229.1	1.31	3*n*	Hl
1889.38	234.2	1.46	3*n*	Maw
1898.65	233.3	1.38	2*n*	Hu
1901.56	232.4	1.42	2*n*	Doo

[β (**V**) ... β (*Mon. Not.* **XXXV**, 31) ... $β^4$ ... Δ (I) ... Hl (**I, II**) ... HΣ (**XII**) ... OΣ (**X**) ... Lv^1 ... Maw (I) ... Boothroyd (*A. J.* 478) ... Do (3680) ... (Greenwich Obsy. (*Mon. Not.* **LXII**, 383; **LXIII**, 403) .... Hu (*Bul. L. O.* No. 44) .... Doolittle (*Pub. Flower Obsy.* **II**) ...]

45 : **8855.** From Glasenapp (I), and credited to "Secchi (App)." This reference is evidently copied from H's *General Catalogue* (No. 7610). I do not find any such pair in the measures of Se, or any pair in this place in any other authority. The pair measured by Glasenapp is closely *f Messier* 11, and apparently not in SD (1905).

45 5 **8858** **Σ 2406.** Fixed.

1866.81	1°.9	4″.85	3*n*	Δ
1902.50	3.0	4.83	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Cin^5 ...]

45 **8859.** **Σ 2407** *rej.* Measures from $β^6$. This is near and *sp β Lyrae.*

45 **8860.** **Σ 2404.** (= **Sh 280.**) Fixed.

1866.51	182°.9	3″.58	3*n*	Δ
1881.59	182.8	3.56	8*n*	Hl
1902.44	182.8	3.63	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**IX, X, XIII, XV**) ... H^1 ... Bp ... Se ... Wr ... Ra (**XXV**) ... Δ (1125, 1194) .... Δ (**I, II**) .... Ba (**II**) .... Je (2407) .... Sp (**II**) .... WS^2 .... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... T (2991) ... Glasenapp (**I, III**) ... Cin^5 ... *A. G. Leipzig*, p. 210 .... *Annals Toulouse Obsy.* **III** .... Coleman (*Mem. R. A. S.* **LIV**) ...]

8861. **Σ 2410.** Perhaps a little change in the angle. $45^m\ 11^s$

1866.83	96°.0	1″.38	3*n*	Δ
1895.54	93.1	1.70	2*n*	Gla
1902.44	90.7	1.61	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Se ... Hd ... WS^2 ... Δ (**II**) ... Glasenapp (**IV**) ... Bryant (*Mon. Not.* **LX**, 510) ...]

8862. ν^1 *Lyrae.* **♅ V. 40.** (= σ 591 = **S** 706.) No change in the Herschel companion. The other stars from $β^3$. The principal star has a proper motion of 0″.020 in 233°.8 (Auwers). 45 18

AB	1905.64	72°.5	36″.18	1*n*	β
AC	1854.14	122.9	59.15	3*n*	OΣ
	1880.63	122.3	58.73	2*n*	Sp
	1905.64	122.5	58.51	1*n*	β
CD	1905.64	212.5	18.37	1*n*	β

[OΣ (**X**) ... Sp (**II**, p. 136) ... $β^3$ ... $β^6$ ...]

8863. **H 1352.** Later measures give: 45 24

1879.57	242°.9	11″.90	2*n*	OΣ	7.z...9.5
1885.59	242.8	11.77	2*n*	HΣ	

[OΣ (**X**) ... Big ... HΣ (**XII**) ...]

8864. ν^2 *Lyrae.* **Ho 440.** The principal star has a proper motion of 0″.034 in 275°.0 (Auwers). The other measures are: 45 24

1904.71	177°.8	19″.25	3*n*	Doo
1905.59	175.2	19.38	2*n*	β

[Ho (3234) ... $β^6$ ...]

8865. **A. G. 226.** Double in *A. G. Lund.* Measures from $β^6$. 45 30

8866. **A 256.** No other measures. 45 31

[A (3784) (*Bul. L. O.* No. 16) ...]

8867. **Σ 2405** *rej.* Probably unchanged. 45 39

1848.65	301°.9	25″.09	1*n*	Mh	
1879.33	300.4	26.25	1*n*	Cin	9.0...11.0
1904.80	302.0	24.45	2*n*	β	8.4...10.5

The 40-inch shows a faint star nearer A:

1904.38	115°.0	13″.90	1*n*	β	...11.8

[Mh ... Cin^5 ... $β^6$ ...]

8868. **β** *Lyrae.* **Σ 39, App. I.** (= **♅ V. 3** = **Sh 281** = **OΣ (App) 275** : AC = **β 293.**) The faint star, C, was noted with the Washington 26-inch; and the still fainter companion, D, was added by Aitken with the 36-inch. Auwers gives the 45 39 proper motion of *β Lyrae*, 0″009 in the direction of 304°1. Between 1835 and 1877 this would increase the distance of the Herschel star about 0″6. As the line of motion is nearly identical with the direction of B, the position-angle would remain unchanged. The measures of these stars do not appear to show any trace of relative motion, and it is therefore probable that they have the same proper motion. The large star was found to be a spectroscopic binary by Pickering (*A. N.* 3051).

A and C

1898.65	247°6	47″13	3*n*	A

A and B

1877.64	149°1	45″85	12*n*	Hl
1895.08	149.0	45.70	4*n*	Gla
1899.81	148.6	45.96	2*n*	Hu

A and E

1898.65	317°8	67″22	3*n*	A

A and F

1898.66	19°0	86″28	2*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β1...β3...A (3585)...]

The measures of AB will be found in the following:

[H (**IV**)...Da3...Ra (**XXII, XXVI, XXVIII**)...Δ (**II**)...Bl (**V**)...Hl (**I**, p. 20)...Hunt (*Observatory* **III**, 605)...En (2662)...T (2866)...Je (2340)...Franz (3080)...Glasenapp (**I, II, III, IV**)...Hu (*Bul. L. O.* No. 44)...]

$45^m\ 52^s$ **8870. H —.** This is No. 529 "Nova" of H^1, but the R. A. there is about 5^m in error. No. 530, "Nova" is given $0.1^m f$, and 1′*n*. This latter is identical with H 870. Probably fixed.

1879.49	24°5	22″05	2*n*	β	8.5...8.7
1904.46	23.7	22.04	1*n*	β	9.1...9.4

[H1...Cin5...β3...β6...**Engelhardt (II)...**]

45 54 **8871. H 870.** "In a cluster." Probably fixed.

1828.65	215°0	8″42	1*n*	H	9 ...10
1879.49	218.7	11.27	2*n*	β	9.5...10.8
1904.42	219.9	11.47	2*n*	β	9.9...10.4

[H1...Cin5...β3...β6...]

46 6 **8872. Ho 569.** No change.

1904.35	40°7	18″66	3*n*	Doo

[Ho (3557)...]

46 8 **8873. Tarrant.** From Tarrant (2899). The only measures since are:

AB	1905.72	294°3	13″09	1*n*	β^6	9.6...10.6
BC	1905.72	240.3	4.04	1*n*	β^6	...10.8

46 12 **8874. Σ 2409.** Probably fixed.

1866.29	30°7	0″86	2*n*	Δ
1884.01	32.7	1.05	5*n*	Per
1898.58	29.4	0.98	2*n*	A
1900.48	35.0	0.89	1*n*	β
1902.48	27.1	0.92	3*n*	Hu

There is a distant 11 m star:

1900.48	195°7	32″70	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...OΣ (**IX**)...Newcomb (*Wash. Obsns.* 1874)...Sk3...Δ (**II**)...Per...Per (2559, 2685)...Glasenapp (**III**)...Brown (3646)...A (3585)...Bowyer (*Mon. Not.* **LX**, 510)...β6...]

8876. Σ 2408. Without change. $46^m\,19^s$

1867.38	95°1	2″32	4*n*	Δ
1902.44	94.0	2.36	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Wn (**V**)...Δ (**II**)...Per...Hl (**I**)...Glasenapp (**I, III**)...]

8877. Hu 199. A later position is: 46 31

1902.17	5°2	0″30	2*n*	Lewis

[Hu (*A. J.* 485)...Lewis (*Mon. Not.* **LXII**, 383; **LXIII**, 403)...]

8878. Σ 2411. *Aquilae* **11.** No motion. 46 50

1865.90	96°2	13″27	3*n*	Δ
1902.40	95.1	13.60	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin5...]

8879. ν^1 *Sagittarii.* **β 1033.** (AC = **H 5072.**) The close star was discovered with the 36-inch. The distance in the first measure, by an error in reducing, was printed in β (XIV) 1″37. It should have been as given here. The proper motion of the principal star is 0″043 in the direction of 243°8 (Auwers). The close attendant is probably moving with it. All the complete measures of the H companion are given. 46 56

A and B

1888.68	104°0	1″86	1*n*	β
1897.62	97.0	2.36	2*n*	See
1898.48	96.0	2.54	4*n*	A
1898.54	106.4	2.32	1*n*	β

A and C (= H 5072)

1878.52	57°8	29″00	1*n*	Cin	...10.5
1897.65	59.2	28.22	1*n*	See	...12.8
1898.58	59.6	28.22	3*n*	β	...10.5

[β (**XIV**)...β (2875)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...See (3496)...A (3585)...Cin4...Cin5...]

8881. Σ 2412. Unchanged. 47 5

1866.29	237°2	1″33	3*n*	Δ	8.3...8.4
1899.61	54.1	1.30	1*n*	Bowyer	8.4...8.5
1902.48	54.5	1.28	3*n*	Hu	

[Ma (*F. S.* **I**)....Ma (**X**)....Se....Δ (**II**)....Newcomb (*Wash. Obsns.* 1874)....Glasenapp (**III**)...Bowyer (*Mon. Not.* **LX**, 510)...]

8883. A 93. No other measures. 47 18

[A (3668)(*Bul. L. O.* No. 29)...]

47ᵐ 24ˢ **8884.** **Σ 2413.** Probably a slow increase in distance.

1865.65	200°8	9″60	3*n*	Δ
1880.70	200.8	9.74	2*n*	Sp
1895.57	200.2	9.90	4*n*	Gla
1902.48	200.1	10.06	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... H (**V**) ... Δ (**II**) ... Glasenapp (**I, IV**) ... Sp (**II**) ... *Annals Toulouse Obsy.* **III** ...]

(See p. 1080)

47 24 **8885.** **Hu 258.** Noted "double" in *A. G. Leipzig.*

1903.57	214°4	2″38	3*n*	Miller

[Hu (*A. J.* 494) ... Miller (4022) ...]

48 3 **8887.** **β 421.** Discovered with the 6-inch. So far without change.

A and B

1893.49	288°5	0″90	2*n*	Lv
1898.48	290.8	1.02	3*n*	Doo

AB and C

1898.48	229°9	39″04	3*n*	Doo

[β (**VII**) ... β (2103) ... Δ (I) ... Lv (*A. J.* 382) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

48 14 **8889.** **Weisse 33.** "Duplex" in W². It is too wide to be of any interest (1901). The components are DM (39°) 3558 and 3557.

48 16 **8890.** **A 257.** No other measures.

[A (3784) (*Bul. L. O.* No. 16) ...]

48 21 **8891.** **H 2844.** No measures in H.

[Glasenapp (**I**) ...]

48 25 **8892.** **OΣ 364.** The single measure given is the only positive observation of this pair. OΣ could not see it double under favorable conditions in 1845, 1847, and 1852, and was inclined to attribute the first measure to an optical deception. This star was single to Ma in 1851, to Δ in 1865, or elongation doubtful, and to β in 1874, 1878, and 1892. The last examination was with the 36-inch with fine seeing. Hu found it single with the same instrument in 1898. It is hardly necessary to give further attention to this star, as there is now no probability of its being really double.

[Ma (**XIII**) ... OΣ (**IX**) ... Δ (**I**, p. 229) ... β1 ... β (3142) (*Pub. L. O.* **II**) ... Hu (*Pub. L. O.* **V**) ... HΣ (**XII**) ...]

48 26 **8893.** **See 364.** Discovered at the Lowell Observatory.

1899.72	96°8	0″51	2*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 486) ...]

48 27 **8894.** **OΣ (App) 176.** Nothing later but this:

1905.25	115°3	96″82	2*n*	β

[Δ (**I**) ... β⁶ ...]

8895. **H 1353.** "Very neat." Howe (Cin⁵) has a pair in this place, 209°1 : 0″94 : 8.5...9.0 (1879.31) 1*n*. This is probably H 1353 with error in reading or printing the distance. 48ᵐ 42ˢ

1879.45	208°6	8″41	2*n*	Cin⁵	8.5...9.5
1901.38	207.3	8.33	2*n*	β⁵	9.0...9.6

8896. **H 1354.** Double in *A. G. Lund.* 48 45

1900.54	6°0	9″87	2*n*	Es	8.8...8.9

[Espin (*Mon. Not.* **LXII**, 532) ...]

8897. **H 2845.** "Very neat." All the measures are given. At least two of the distances must be erroneous. 48 55

1878.58	5°0	3″85	2*n*	Cin	8.0...10.0
1886.65	5.9	5.13	1*n*	LM	
1890.57	5.3	4.68	2*n*	Gla	8.2... 8.7

[Cin⁵ ... LM ... Glasenapp (**I**) ...]

(See p. 1080)

8898. **Lewis 26.** From *Mon. Not.* LX, 510. The place is substantially identical with that of the 7,9 m star, DM (34°) 3346. This was examined on two nights with the 40-inch, and no pair answering the description found in or near this place. 49

[Lewis (*Mon. Not.* **LX**, 510) ... β⁶ ...]

8899. **Dunér 2.** From Du, p. 161. It agrees in distance with C of β 647 (No. 8912), but the angles do not correspond. 49

8901. **Ho 89.** Probably unchanged. 49 13

1902.25	168°3	6″50	6*n*	Doo

[Ho (2778, 3558) ... Lewis (*Mon. Not.* **LIX**, 420) ...]

8902. **Σ 2416.** Distance increasing from proper motion. 49 15

1830.78	156°9	15″61	2*n*	Σ
1844.36	158.4	15.72	1*n*	Ma
1866.99	157.6	16.35	3*n*	Δ
1896.52	155.8	17.20	4*n*	Soulé
1902.46	156.4	17.54	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ... Flm ... Δ (1735) ... Soulé (*A. J.* 410) ...]

8903. **H 871.** "The *f* star of an equilateral triangle." 49 15

8905. **Σ 2415.** *Herculis* **490.** Fixed. 49 23

1868.37	296°2	1″96	4*n*	Δ
1902.26	296.2	2.09	3*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**V**) ... Se ... Δ (**I, II**) ... Δ (1209) ... Glasenapp (**III**) ... Lewis (*Mon. Not.* **LX**, 510) ... Coleman (*Mem. R. A. S.* **LIV**) ...]

8906. o *Draconis.* **Σ 2420.** (= **♅ IV. 20 = Sh 284.**) 49 25
The motion is rectilinear, and due to the proper motion of the large star:

Auwers	0″080	in 77°0
Measures	0.099	in 84.1

1833.81	346°2	30″33	5*n*	Σ
1836.78	345.6	30.36	4*n*	Σ
1843.32	344.[illegible]	30.59	1*n*	Ma
1865.46	340.4	30.99	8*n*	Δ
1883.41	337.[illegible]	31.42	6*n*	En
1889.55	335.9	31.43	3*n*	Hl
1896.54	335.0	32.00	2*n*	Hu
1905.53	333.5	32.09	3*n*	β

[Ma (*F. S.* **I**)...Ma (324)...Ma (**IX, XI, XIII**)...H 1...H (**V**)...Flm...Ra (**XXV**) Hd...Δ (1194)...Δ (**I, II**)...K (1519)...Pk...Hl (**II**)...Sk 2...En (2677)... Glasenapp (**III**)....Hu (*A. J.* 397)....*Annals Toulouse Obsy.* **III**....Espin (*Mon. Not.* **LXIV**, 677)...β 6...]

$49^m\ 32^s$ **8907.** δ^1 *Lyrae.* **H VI. 3.** (= σ 594.) The 9.2 m star, DM (36°) 3308, is probably the companion star referred to by Herschel. The relation of this to A is, 20°0 : 174″58 (1905.89). δ^2 *Lyrae* is 46ˢ4 *f* and 4′ 34″ *n*. The two form a naked-eye pair. δ^1 *Lyrae* was found to be a spectroscopic binary by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XIX, 352). The proper motion is small, 0″026 in 279°0 (Auwers).

49 41 **8908.** 113 *Herculis.* **β 646.** Discovered with the 18½-inch. The large star has a proper motion of 0″024 in the direction of 305°8 (Auwers).

B and C

1892.71	332°4	6″48	2*n*	Ho	12.0...12.1
1899.73	150.1	6.86	3*n*	Doo	13.0...13.5

A and B

1892.70	31°9	35″29	1*n*	Ho
1899.73	32.4	35.82	3*n*	Doo

A and C

1899.73	23°3	39″48	3*n*	Doo

The principal star was found to be a spectroscopic binary by Wright (*Astrophysical Jour.* XII, 254).

[β (**X**)...β 1...Ho (3234)...Doolittle (*Pub. Flower Obsy.* **I**)...]

49 48 **8909.** **β 137.** Discovered with the 6-inch. There is a slight advance in the angle of the close pair. Some of the later measures are:

A and B

1875.68	123°9	1″15	4*n*	Sp
1880.47	126.9	1.10	1*n*	β
1888.77	127.8	1.17	6*n*	T
1891.49	130.0	1.14	3*n*	β
1896.60	132.3	1.34	3*n*	Lewis
1897.46	130.6	1.24	2*n*	Lewis
1898.59	131.9	1.13	3*n*	Doo
1905.53	136.7	1.28	3*n*	Doo

A and C

1884.64	141°9	17″68	1*n*	En
1896.97	140.8	18.67	2*n*	Lewis
1898.59	141.6	18.68	3*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β 3...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)... Sp (2133)...Sp (**II**)...En (2678)...T (2991)...Doolittle (*Pub. Flower Obsy.* **I**)...Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 510)...Biesbroeck...]

8910. **H 5503.** "*White: blue.*" R. A. in H about 3^m too small. In O. Arg. S. 7 m, but more nearly 8 m (1876). $49^m\ 55^s$

1903.40	79°2	37″98	2*n*	β^6	7.4...11.0

8911. **β 972.** Discovered with the 18½-inch. 49 59

A and B

1893.49	5°4	0″94	2*n*	Lv
1893.65	3.0	1.20	2*n*	Wilson

A and C

1893.49	14°2	73″48	2*n*	Lv
1893.65	14.2	73.48	2*n*	Wilson

[β (**XIII**)...β 3...Ho (3234)...Lv (*A. J.* 382)...Wilson ( )...]

8912. **β 647.** Discovered with the 18½-inch. Change in distance of C? (See No. 8899.) In *Pub. Y. O.* I this is erroneously called DM (13°) 3816 instead of 3814. 50 0

A and B

1892.58	8°0	0″81	1*n*	Ho
1898.57	10.3	1.16	4*n*	A
1900.51	15.3	0.97	2*n*	β
1903.51	8.5	1.03	3*n*	Doo
1905.72	13.5	1.13	1*n*	β

AB and C

1877.72	215°8	19″56	2*n*	Δ
1885.56	217.2	19.30	3*n*	de Ball
1892.58	216.5	19.25	1*n*	Ho
1898.57	217.7	19.09	3*n*	A
1900.51	217.4	19.02	2*n*	β
1903.51	217.2	19.19	3*n*	Doo
1905.72	217.4	19.06	1*n*	β

[β (**X**)...β 1...Δ (I)...Ho (3234)...de Ball (2753)...A (3585)...β 5...Doolittle (*Pub. Flower Obsy.* **II**)...β 6...]

8913. **Σ 2414.** Since Part I of this catalogue was in type, Aitken has discovered a close companion to the principal star of Σ 2414. His measures give: 50 6

A and B

1905.51	95°9	0″73	3*n*	A	8.0...13.5

There is no change in the Struve companion.

1868.88	278°4	16″83	4*n*	Δ
1880.53	277.5	17.16	2*n*	β
1902.46	278.3	17.36	2*n*	Hu
1905.44	278.5	17.15	1*n*	A

[Ma (*F. S.* **II**)...Mh...Δ (**II**)...Cin 5...β 3...]

(See No. 13438)

8914. θ *Serpentis.* **Σ 2417.** (= **H IV. 6 = Sh 283.**) A slight increase in the distance, and a small common proper motion, 0″042 in 29°5 (Auwers). 50 15

1865.71	104°0	21″78	4*n*	Δ
1868.76	103.6	21.56	5*n*	Du
1885.80	103.7	21.95	8*n*	Per
1889.58	103.6	22.01	5*n*	Giacomelli
1902.48	104.3	22.18	3*n*	Hu

[Ma (*F. S.* **I**) .... Ma (324) .... Ma (**IX, X, XI, XIII, XV**) .... Ma (*Beiträge zur physischen Kenntniss*, Weimar, 1841) ... H (**V, VII**) ... Bes ... BM (280) ... Da^{1} ... K ... K (409) .. Ek (I) ... En ... Se^{1} ... Auwers (1393) ... Wh ... Ra (**XXI, XXIX, XXXVIII**) ... Ba (**II**) ... Kn ... Pk ... Δ (1209) ... Δ (**I, II**) ... OΣ (**IX**) ... Du ... Nobile (*Rend. della R. Accad. Sci.* Napoli, Nov. 1875) ... Je (2407) ... Per ... Per (2685) ... Giacomelli (**III**) ... Franz (2590) ... Hl (**I**, p. 134) ... Glasenapp **I, III**) ... Cohn (3240) ... Coleman (*Mem. R. A. S.* **LIII**) ... *Annals Toulouse Obsy.* **III** ...]

$50^{m}\ 18^{s}$ **8915.** **Ho** 90. No motion.

1901.76	224°.2	3″.90	4*n*	Doo

[Ho (2778, 3558) ...]

50 28 **8916.** **OΣ** 525. *Lyrae* 91. (AC = σ 596 = **Sh** 282.) No change. B. A. C. 6468.

A and B

1871.75	128°.5	1″.68	10*n*	Δ
1879.50	125.8	1.70	2*n*	β
1898.65	127.8	1.66	4*n*	Hu
1902.49	128.6	1.73	2*n*	Doo

A and C

1871.88	350°.2	45″.34	4*n*	Δ
1880.49	350.6	45.31	2*n*	β
1898.63	350.3	45.48	3*n*	Hu

[OΣ (**IX, X**) ... Da^{3} ... Δ (I) ... Kn ... β^{1} ... β^{3} ... Bl (**V**) ... En (2678) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

50 31 **8917.** **Σ** 2418 *rej.* The only measure is:

1902.53	7°.7	16″.08	1*n*	Hu

50 34 **8918.** **A** 258. No other measures.

[A (3784) (*Bul. L. O.* No. 16) ...]

50 47 **8920.** **Σ** 2419. Fixed.

1868.85	178°.2	3″.17	4*n*	Δ
1902.53	177.7	3.30	1*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... Se ... Δ (**II**) ... Glasenapp (**IV**) ...]

50 52 **8921.** **Σ** 2423. Fixed.

1866.98	202°.0	2″.10	3*n*	Δ
1904.45	200.2	2.28	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Δ (**II**) ...]

50 56 **8922.** **H** 5504. "Coarsely double." Very distant 10 m companion *np* (1876).

51 1 **8923.** **Ho** 270. Nothing later but the following:

AB	1904.71	297°.8	9″.2	1*n*	Doo	... 13.7
AC	1904.71	39.9	23.68	3*n*	Doo	

[Ho (2977) ...]

8924. **Ho** 271. Later observers make the distance larger. 51^{m}

1897.74	329°.8	17″.11	3*n*	See
1904.69	331.8	16.96	3*n*	Doo

[Ho (2977) ... See (3496) ...]

8925. **Σ** 2421. There seems to be a small proper motion in one of the stars. 51 37

1829.25	68°.8	21″.15	2*n*	Σ
1866.12	66.5	21.92	3*n*	Δ
1880.46	65.4	22.46	4*n*	β
1895.63	64.1	22.72	2*n*	Gla
1902.49	64.4	22.76	2*n*	Hu
1903.35	64.0	22.65	2*n*	β

[Ma (*F. S.* **II**) .... Δ (1736) .... Δ (**II**) .... Bl (**V**) .... Sp (**II**) .... Flm .... β^{3} .... Pt .... Glasenapp (**IV**) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ...]

8926. **β** 1255. B. A. C. 6476. Discovered with the 36-inch. A naked-eye star in *Draco.* Heis 6 m; Harvard 5.9. The measures of Lewis in 1897 belong to some other pair. 51 37

The large star has a proper motion of 0″.173 in 191°.8 (Paris), and the companion is evidently moving with it.

1898.56	88°.8	1″.56	1*n*	β
1898.64	89.3	1.78	3*n*	A
1900.64	89.7	1.43	1*n*	Lewis

[β (**XVIII**) ... β (3113) (*Pub. L. O.* **II**) ... A (3585) ... Lewis (*Mon. Not.* **LIX**, 420; **LXI**, 497) ...]

8927. **Hu** 676. No other measures. 51 44

[Hu (*Bul. L. O.* No. 57) ...]

8930. **Σ** 2422. Change in angle only. 52 15

1840.69	106°.5	0″.98	2*n*	OΣ
1855.14	100.7	0.80	2*n*	OΣ
1869.18	99.7	0.79	5*n*	Δ
1875.68	98.5	0.76	3*n*	Sp
1883.42	102.1	1.00	6*n*	En
1884.24	97.1	0.76	10*n*	Hl
1886.94	97.7	0.89	4*n*	HΣ
1891.04	94.2	0.85	3*n*	Maw
1902.56	94.1	0.85	6*n*	Bowyer

[Ma (*F. S.* **I**) .... Ma (**IX, X, XI**) .... OΣ (**IX**) .... Se ..... Du .... Se (*Comp. Rend.* **XLVIII**, 375) ... Flm ... Sp (2133) ... Sp (**I, II**) ... Δ (2195) ... Δ (**II**) ... Per ... Per (2748) ... Newcomb (*Wash. Obsns.* 1874) ... En (2677) ... Hl (*Wash. Obsns.* 1882, 1883, 1886) ... Hl (**II**) ... Maw (**I**) ... Glasenapp (**III**) ... Big (*Bul. Ast.* **XII**, 299) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIV**, 803) ... HΣ (**XII**) ...]

8932. **OΣ** 365. (AC = **Σ** 3130.) The principal star of Σ 3130 was thought by OΣ to be a very close pair, and measured as such in 1841. Other observers since have seen an elongation with more or less certainty, but it has always appeared single in the principal large refractors, and on the whole the weight of the evidence is against its being really 52 20 double. The following are the leading positive and negative results:

A and B

1841.65	168°.1	0″.50	1*n*	OΣ
1843.41	74.5	0.3±	1*n*	Ma
1844.85	212–232	Obl.	1*n*	OΣ
1845.15	235 ?	Doubtful	1*n*	OΣ
1845.69	212 ?	Doubtful	1*n*	OΣ
1847.59	226	Doubtful	1*n*	OΣ
1848.74	242 ?	Obl.	1*n*	OΣ
1849.82	250 ?	Obl.?	1*n*	OΣ
1851.60	276	0.2±	1*n*	OΣ
1851.75	273	Obl.	1*n*	OΣ
1852.63		Single	1*n*	OΣ
1854.66		Single	2*n*	OΣ
1857.67	166.1	0.50	1*n*	OΣ
1865-66		Single	2*n*	Δ
1874.50	241.3	0.3±	2*n*	Sp
1877.66	250.2	0.3 ±	3*n*	Sp
1878.41		Single		β
1880.59		Single		β
1880.68	254.8	0.3±	3*n*	Sp
1882.63	287.7	0.35±	1*n*	Sp
1883.63	250.8		1*n*	Sp
1889.46	Single, 36-in.			β
1890.57				
1897.84	Single, 36-in.			A, Hu
1898.35				

There is no change in the Struve companion.

A and C (= Σ 3130)

1870.08	261°.1	2″.83	6*n*	Δ
1885.62	265.6	2.74	4*n*	Hl
1897.44	262.3	2.50	3*n*	Lewis
1898.71	262.9	2.93	1*n*	Hu

Lewis measures a pair of small stars, the approximate place of which is 1^m *f* and 1′ *s* of Σ 3130:

1897.41 37°.3 3″.07 1*n* Lewis 10...11

[Ma (*F. S.* **II**)...Ma (**XI, XIII**)...OΣ (**IX**)...Flm...Δ (**I**, p. 229)(**II**)...Sp (**I, II**) ...Bl (**V**)...Newcomb (*Wash. Obsns.* 1874)... Hl (*Wash. Obsns.* 1884, 1886) Hl (**II**)...β 1...β 3...β (2957, 3048) (*Pub. L. O.* **II**)... Lewis (*Mon. Not.* **LIX**, 400)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

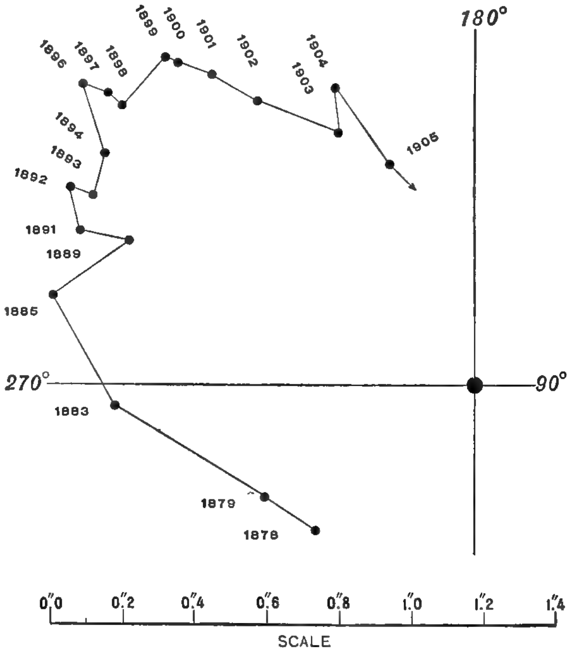
52^m 30^s **8933. β 648.** B. A. C. 6480. This is a naked-eye star near γ *Lyrae.* Discovered with the 18½-inch. At that time it was a very difficult object, but in later years the distance considerably increased, and it has been measurable with moderate apertures. It was certain at the beginning that this was a binary system, since the two stars must have the same proper motion, as otherwise it would have been recorded as a double star long before. The proper motion is:

Porter 0″.231 in 134°.8
Paris 0.265 in 135.7

The form of the apparent orbit will necessarily be wholly uncertain until the companion is measured in the first quadrant. There is nothing in the present observations to indicate what that distance will be. The components may then form a very close pair, or have a separation as large as that at the time of discovery.

The following are all the measures:

1878.47*	312°.5	0″.60	2*n*	β
1879.47*	298.3	0.66	1*n*	β
1883.64*	273.4	1.00	2*n*	HΣ
1885.61*	258.0	1.19	1*n*	HΣ
1889.87*	247.4	1.04	1*n*	Sp
1891.33*	247.7	1.26	3*n*	β
1891.63*	249.6	1.10	3*n*	T
1891.84	241.4	1.37	1*n*	HΣ
1892.38*	245.6	1.29	5*n*	β
1892.70*	242.5	1.21	4*n*	Sp
1893.43*	246.1	1.26	2*n*	Wilson
1893.49*	240.2	1.40	2*n*	Lv
1893.77*	240.8	1.12	1*n*	Sp
1894.78*	237.9	1.22	4*n*	Sp
1895.90*	237.9	1.49	3*n*	Lewis
1896.45*	238°.7	1″.62	1*n*	β
1896.47*	225.1	1.33	1*n*	Dyson
1896.49*	231.5	1.34	3*n*	A
1896.57*	233.4	1.45	3*n*	Lv
1896.62*	233.2	1.27	4*n*	Lewis
1896.77*	232.6	1.30	3*n*	Sp
1897.44*	229.1	1.36	1*n*	Bowyer
1897.54*	231.2	1.14	4*n*	Lewis
1897.70*	229.8	1.33	3*n*	A
1897.74*	235.5	1.40	2*n*	Brown
1898.40*	227.7	1.33	3*n*	A
1898.54	230.2	1.50	1*n*	Lewis
1898.67*	228.3	1.24	2*n*	Bryant
1898.92*	228.2	1.21	2*n*	β
1899.34*	223.3	1.26	3*n*	A
1899.44	222.4	0.96	1*n*	Lewis



β 648.

1900.48*	222°.3	1″.15	3*n*	A
1900.54*	221.2	1.34	2*n*	Lohse
1900.62*	224.2	1.17	2*n*	Lewis
1900.73*	222.3	1.27	4*n*	β
1900.73*	228.9	1.10	1*n*	Bryant
1901.57*	221.7	1.23	5*n*	Doo
1901.61*	220.0	1.11	2*n*	Lewis
1901.62*	219.0	1.07	3*n*	A
1902.43*	215.8	1.04	3*n*	A
1902.63*	217.3	1.00	1*n*	Lewis
1903.59*	208.3	0.80	1*n*	A
1903.70	209.0	1.40	2*n*	Lohse
1903.95	212.2	1.27	3*n*	Biesbroeck
1904.45*	202.2	0.96	1*n*	A
1904.64*	208.1	0.88	5*n*	Lohse
1905.37*	200.8	0.66	2*n*	A

Lohse finds a provisional orbit (unpublished) giving a period of 50.85 years.

[β (**X**)...β1...β (3114, 3142)(*Pub. L. O.* **II**)(*Observatory*, Dec. 1891)...Sp (**III**) ... T (3186) ... Wilson ( ) ... Gaudibert (*L'Astronomie*, Sept. 1892) ... Lv (*A. J.* 382, 407) ... HΣ (**XII**) ... Brown (3646) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403)....A (3396, 3585, 3639)(*Bul. L. O.* No. 11)(*A. J.* 429) .... Biesbroeck .... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...Lohse (*Pub. Potsdam Obsy.*)...β5...]

(See p. 1080)

52m 44s **8934.** **A** 259. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

52 52 **8935.** **H** 1356. Probably fixed.

1873.47	343°.5	28″.98	1*n*	Δ	7.5...8.0
1901.63	343.7	29.23	2*n*	Es	8.3...9.0

[Δ (**I**)...Espin (*Mon. Not.* **LXIV**, 679)...]

52 54 **8936.** **Ho** 91. Unchanged.

1904.43	131°.2	6″.42	3*n*	Doo

[Ho (2778, 3234)...]

53 3 **8937.** **A** 260. No other measures.

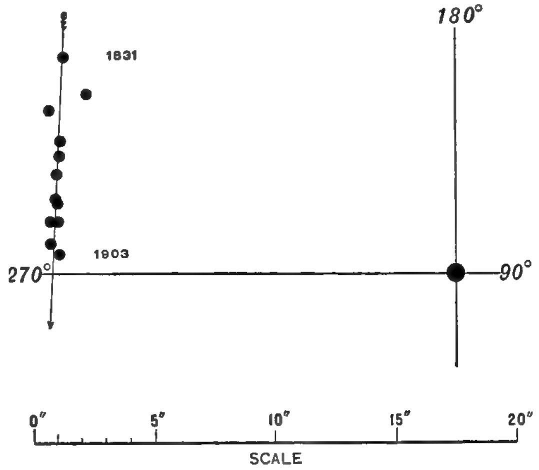
[A (3784)(*Bul. L. O.* No. 16)...]

53 34 **8940.** 11 *Aquilae*. **Σ** 2424. (= ℌ III. 32 = S 707). The movement of the companion is rectilinear, and corresponds exactly to the proper motion of the large star. This is given:

Auwers	0″.115 in 190°.2
Bossert	0.111 in 187.6
Paris	0.117 in 180.0

The following positions are shown on the diagram:

1831.31	241°.6	18″.66	3*n*	Σ
1843.62	244.7	17.12	2*n*	Ma
1851.90	248.6	17.82	2*n*	Σ
1864.17	252.0	17.35	8*n*	Δ
1869.77	254.0	17.22	2*n*	Du
1876.58	256.5	17.12	1*n*	OΣ
1885.06	260°.0	16″.94	4*n*	Per
1887.68	260.3	16.89	2*n*	HΣ
1895.61	263.0	16.71	2*n*	Gla
1897.74	263.1	17.01	2*n*	Coleman
1902.48	266.2	16.90	3*n*	Hu
1903.60	267.5	16.56	2*n*	Biesbroeck



11 Aquilae. Σ 2424.

[Ma (**XI**, **XIII**, **XV**)....Ma (324)....Ma (*F. S.* **I**)....Σ (*Pos. Med.* ccxxxi)....OΣ (**IX**, **X**)...Δ (1474)...Δ (**II**)...Flm ...WS...WS2...Gl... Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Per...Per (2748)...Du...Sp (**II**) ... En (2677) ... Engelhardt (**II**)...T (2898) ... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LXII**, 383; **LXIII**, 403)....Glasenapp (**IV**)....*A. G. Leipzig*, p. 210 .... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Sk5 ... Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...]

8941. **H** 1357. The only measures are: 53m 34s

1901.44	212°.5	26″.83	2*n*	β	8.0...10.5
1901.64	212.1	26.23	2*n*	Es	7.9...11.7

[β5...Espin (*Mon. Not.* **LXIV**, 679)...]

(See p. 1080)

8943. **Σ** 2427. The distance of AB is increasing. As 53 57
there appears to be no change in BC, it is evident that A has a small proper motion, which from the measures is about 0″.064 in the direction of 221°.

A and B

1828.74	63°.6	44″.24	2*n*	Σ
1868.26	62.6	46.63	4*n*	Δ
1880.66	62.2	47.23	3*n*	Sp
1900.85	61.5	48.54	2*n*	β
1905.64	61.4	48.57	1*n*	β

B and C

1829.08	80°.1	6″.89	3*n*	Σ
1842.76	80.8	7.28	1*n*	Ma
1856.64	80.1	7.24	2*n*	Se
1868.26	80.8	7.00	4*n*	Δ
1880.66	81.5	7.16	3*n*	Sp
1900.85	79.1	7.18	2*n*	β
1905.64	79.8	7.08	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)... Se...Flm...Δ (1736)... Δ (**II**) ... Sp (**II**) ...*Annals Toulouse Obsy.* **III**...β5...β8...]

$53^m\ 57^s$ **8944.** **H** 1358. No motion.

1873.47	265°0	14″24	1*n*	Δ	8.5...9.0
1905.64	265.6	14.56	1*n*	β	

[Δ (I)...Big...β^6...]

54 : **8946.** **Ward.** A faint triple, closely *f* ε *Aquilae*, discovered by I. W. Ward with a 4.2-inch refractor. Measures by β^6.

54 3 **8947.** **Σ** 2425. Distance may be a little less.

1867.16	181°9	31″73	4*n*	Δ
1902.48	180.8	31.18	3*n*	Hu

[Ma (*F. S.* **II**)... Ma (**XIII**) ... Mh... H (**VII**)... Ferguson (*Wash. Obsns.* 1863) ... Δ (**II**)...Je (2407)...*Annals Toulouse Obsy.* **III**...]

54 12 **8950.** **Σ** 2429. (= **♅** I. 58 = **S** 709.) Fixed.

1868.85	288°3	5″39	4*n*	Δ
1878.70	288.7	5.33	3*n*	Sp
1897.77	286.2	5.63	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)... Bp... Da^3... Se...Se^2... Ba (**II**)...WS^2... Bru^2... Sk^2...Δ (**II**)...Sp (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

54 18 **8951.** **A** 261. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

54 24 **8953.** **β** 649. Discovered with the 18½-inch. This pair is 13′ *s* of γ *Lyrae.* Probably no change. The following are all the other measures:

1891.37	7°3	1″59	3*n*	β
1899.30	7.5	1.59	6*n*	Gr. Obsy.
1903.54	5.8	1.54	6*n*	Doo

[β (**X**) ... β^1....β (3114)(*Pub. L. O.* **II**)....Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

54 25 **8954.** **Σ** 2426. No motion. The angle in *Mens. Microm.* is 180° in error.

1866.32	259°5	16″74	4*n*	Δ	7.1...9.0
1878.93	260.0	16.97	4*n*	Sp	
1904.41	259.9	16.89	2*n*	β	7.2...8.8

There is a 12.7 m star near B:

BC	1904.41	167°5	3″89	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... En (1518, 1674)... Ra (**XXIV**)... WS ... WS^2...Gl...Δ (1209) ...Δ (**I, II**)...Sp (**II**)...T (3185)...Glasenapp (**I, III**)... *A. G. Leipzig*, p. 210...*Annals Toulouse Obsy.* **III**...β^6...]

54 27 **8955.** γ *Lyrae.* **A. G. Clark** 9. (= **OΣ** 544.) Discovered by Alvan G. Clark with a 12-inch refractor. It is also given in the subsequently published Poulkowa observations. There is no material change. The proper motion of the principal star is small, 0″017 in 297°8 (Auwers).

1878.43	301°1	12″76	2*n*	β
1883.77	300.7	12.92	1*n*	Young
1899.70	299.6	13.20	3*n*	Hu
1900.76	299.6	12.82	3*n*	β

In 1879 I measured a distant 10.5 m star, but there is an error of five revolutions of the screw in the reduced distance. It should be as given here:

1879.30	20°9	176″54	1*n*	β
1904.40	21.3	177.26	2*n*	β

[OΣ (**IX**)...Newcomb (*Wash. Obsns.* 1874)....β (*Am. Jour. Sci.* April 1879)... β^1...β^3...Hu (*Pub. L. O.* **V**)...A (*Bul. L. O.* No. 11) ...β^5...β^6...]

8956. **Σ** 2428. (= **♅** II. 93 = **S** 708.) Fixed. $54^m\ 29^s$

1865.96	287°5	6″47	3*n*	Δ
1892.69	287.5	6.52	2*n*	T
1905.72	288.3	6.91	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Ra (**XXI**)...WS^2...Δ (**II**)...T (3185)...β^6...]

8957. **H** 874. "The principal star of a cluster." The 40-inch shows a new and nearer companion: 54 35

AB	1901.41	0°6	9″70	3*n*	β^5	7.1...13.3
AC	1901.41	304.2	22.96	3*n*	β^5	...11.7

8960. **Hu** 677. No other measures. 54 40

[Hu (*Bul. L. O.* No. 57)...]

8960½. **Hn** 33. Double in *Cordoba Zones.* Later measures show no motion. 54 40

1888.60	60°6	2″60	3*n*	Com
1904.46	60.0	2.37	3*n*	Doo

[β^4...Lv^1...LM...Com (**VI**)...See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8961. **Σ** 2430. Fixed. 54 41

1868.51	179°7	1″80	4*n*	Δ
1895.58	181.8	1.62	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Δ (**II**)... Glasenapp (**IV**)...]

8962. **Σ** 2433. No change. 54 43

1866.24	126°3	7″47	3*n*	Δ
1901.66	125.4	7.53	2*n*	Espin

[Ma (**XI, XV**)...Ma (*F. S.* **I**)...Δ (**II**)...Espin (*Mon. Not.* **LXII**, 530)...]

8963. **Σ** 2431. *Lyrae* 105. (= **♅** IV. 93.) No change. 54 51

1865.92	236°7	18″97	3*n*	Δ
1905.44	236.6	18.97	2*n*	β

[Ma (*F. S.* **II**)...H (**IV, V**)...Bl (**V**)...Δ (**II**)...β^6...]

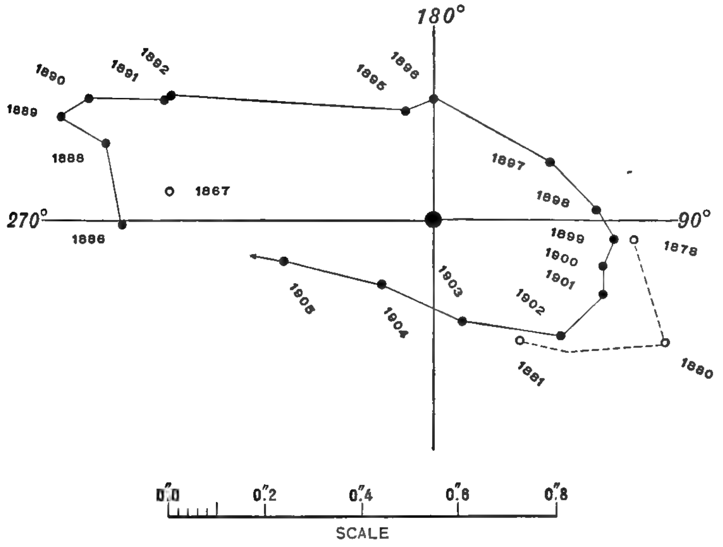
54^m 59^s **8964.** **Hu 678.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

55 0 **8965.** *ζ Sagittarii.* **Hd 150.** (AC = **♅ V. 78.**) Close pair discovered by Winlock. It is one of the most rapid of the older binary systems. As nearly two revolutions have been made since the first measures, the period is very accurately known. The system has a proper motion of 0″.053 in 279°.8 (Auwers).

The following orbits have been published:

1881	Gore	18.69 yrs.	*Mon. Not.* XLVI, 444
1892	Froley	17.71	*Ast. and A.-P.* XII, 510
1895	See	18.85	*Evolution of the Stellar Systems*
1900	Aitken	21.17	*Pop. Ast.* IX, 57
1901	Doberck	21.62	*A. N.* 3970
1905	Barnes, W. L.	20.9	(Unpublished)



ζ Sagittarii.

The following are all the measures:

1867.60*	267°.8	0″.62	2*n*	Hd
1867.80*	260.8	0.48	1*n*	Newcomb
1869.74	352.7	....	1*n*	Hd
1869.74	259.0	....	1*n*	Hd
1878.70*	84.2	0.42	1*n*	*β*
1880.62*	62.1	0.55	2*n*	*β*
1881.61*	36.1	0.31	2*n*	*β*
1886.62*	271.3	0.65	4*n*	Hl
1886.74	271.1	....	1*n*	Pollock
1886.77	271.9	0.53	1*n*	Lv
1887.65	264.1	....	5*n*	Pollock
1888.62*	257.4	0.70	6*n*	*β*
1888.71	261.2	0.65	1*n*	Lv
1889.41*	255.1	0.81	5*n*	*β*
1890.49*	251.1	0.76	3*n*	*β*
1891.53*	246°.5	0″.61	3*n*	*β*
1891.57	253.7	0.57	1*n*	Lv
1892.39*	245.1	0.60	3*n*	*β*
1895.32*	194.7	0.36	3*n*	See
1895.62*	193.6	0.13	2*n*	Barnard
1895.74*	193.1	0.2±	1*n*	See
1896.69*	179.8	0.25	1*n*	See
1897.71*	115.8	0.27	3*n*	See
1897.76	93.6	0.22	1*n*	Cogshall
1897.76	98.7	0.18	1*n*	Boothroyd
1898.49*	93.1	0.34	2*n*	A
1899.52*	83.8	0.38	3*n*	A
1900.62*	74.5	0.37	2*n*	A
1900.83	76.6	0.44	5*n*	Innes
1901.49*	66.3	0.39	4*n*	A
1901.73	61.9	0.65	3*n*	Innes
1902.55	51.2	0.43	1*n*	Innes
1902.66*	47.6	0.36	2*n*	A
1903.52*	15.1	0.19	4*n*	A
1904.67*	321.2	0.17	2*n*	A
1905.40*	296.2	0.32	2*n*	A

The only measure of the distant star which makes ♅ V. 78 is the following:

AB and C

1905.70	302°.5	75″.01	1*n*	*β*	...10

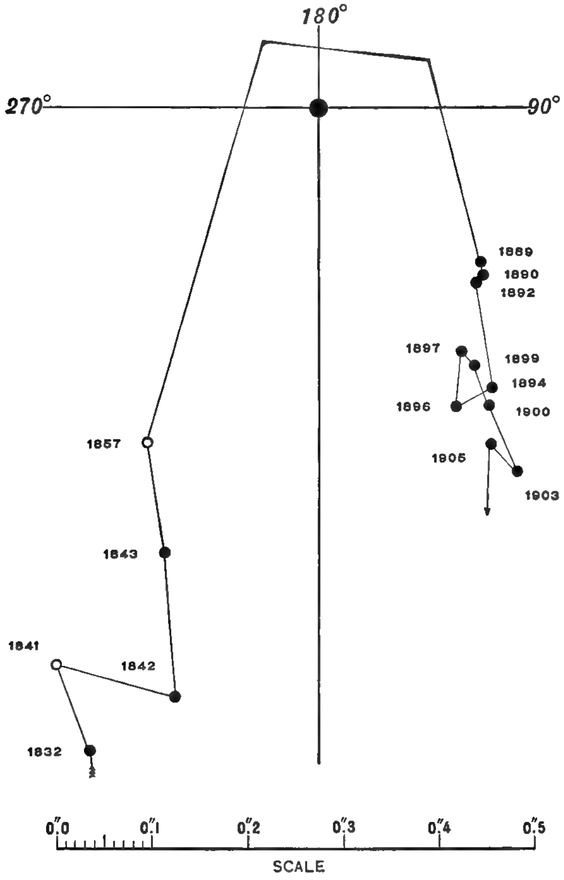
[Hd... Newcomb (*Wash. Obsns.* 1867) ... Hl (*Wash. Obsns.* 1886)... Hl (**II**) ... Pollock (*Mem. R. A. S.* **L**, 72) (*Pub. Sydney Obsy.* 1891) .... Russell (*Mon. Not.* **XLVII**, 473)...Gore (*Mon. Not.* **XLVI**, 444)...Lv¹...Lv (*Proc. Haverford Coll. Obsy.* 1891) ... LM ... See (*Ast. and A.-P.* **XII**, 510)..*β*¹...*β*²... *β*³...*β*⁴...*β*⁶... *β* (2338, 2875, 2957, 3048, 3114, 3142) (*Pub. L. O.* **II**, pp. 105, 247)...Barnard (*A. J.* 447)... Everett (*Mon. Not.* **LVI**, 464)... See (*A. J.* 349, 359, 378).... See (3496)(*Evolution of the Stellar Systems*).... A (3585, 3639) (*Bul. L. O.* No. 11)(*Pop. Ast.* **IX**, 57)(*Pub. A. S. P.* **XV**, 218)...Innes (*Mon. Not.* **LXI**, 606; **LXII**, 478; **LXIII**, 76)(*Annals Obsy. Cape Good Hope* **II**)...]

(See p. 1080)

8966. **Σ 2438.** (= **♅ I. 43.**) Binary of long period. 55^m 29^s Although the companion has moved in position-angle more than 300° since the measures of Struve, the time of revolution cannot be conjectured. Evidently the apparent orbit is an extremely elongated ellipse, but there is nothing in the measures to fix with any certainty the maximum distance of the components in the first and fourth quadrants.

1782.26	358°.4	....	1*n*	♅
1832.53*	340.6	0″.72	4*n*	Σ
1841.80*	335.1	0.65±	1*n*	Da
1842.61*	346.4	0.64	3*n*	OΣ
1843.48*	341.1	0.50	5*n*	Ma
1857.54*	333.2	0.4±	4*n*	Se
1863.62	150	Obl.	1*n*	*Δ*
1870.51	133	Obl.	1*n*	*Δ*
1870.87	306	0.5±	1*n*	OΣ
1874.74	146	Obl.	1*n*	*Δ*
1879.54	"Not double"		1*n*	Hl
1889.46*	46.2	0.24	3*n*	*β*
1890.54*	44.6	0.25	3*n*	*β*
1892.41*	42.1	0.25	3*n*	*β*
1894.75*	31.7	0.35	2*n*	Big
1896.50*	25.0	0.35	3*n*	Lv
1897.82*	30.4	0.30	3*n*	A
1899.43*	31.3	0.32	2*n*	Lewis

1900.57*	30°0	0″38	3*n*	Doo
1900.76*	29.7	0.35	2*n*	A
1903.58*	28.5	0.46	3*n*	Do
1903.91*	28.7	0.42	3*n*	Biesbroeck
1905.46*	27.2	0.40	1*n*	A



Σ 2438.

[Ma (*F. S.* **I**)...Ma (**IX, XI**) ...H (**V**)...Bp...Da³...Se (*Comp. Rend.* **XLVIII**. 375)...Se...Flm... OΣ (**IX**)...Δ (1736)...Δ (**II**)...Gl...WS...Sk...Sk²... Do (2316)...Hl (**I**)...β (2957, 3048, 3142) (*Pub. L. O.* **II**)...Lv (*A. J.* 407)... Glasenapp (**III**)....Big (*Bul. Ast.* **XII**, 299)....A (*A. J.* 429)....Lewis (*Mon. Not.* **LIX**, 400; **LX**, 510)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **I**)...Do (3931)...Biesbroeck...]

(See p. 1080)

$55^{m}\ 44^{s}$ **8969.** **H 2850.** "A beautiful double star." Double in *A. G. Berlin.*

1876.44	274°7	2″51	4*n*	Δ	8.2...9.0
1902.44	276.4	2.49	2*n*	β	8.2...8.6

[Δ (**II**)...β⁶...]

55 46 **8971.** **H 1359.** "In the middle of a cluster."

1903.38	197°2	16″72	2*n*	β⁶	8.7...12.2

55 48 **8972.** **A 588.** "A 4″ pair of 15 m stars 20″ *s* of AB."

[A (*Bul. L. O.* No. 50)...]

8973. **β 973.** (CD = **H. A. Howe 45** : AD = **Σ 2435**.) The smaller component of Σ 2435 was discovered to be double by Howe at Cincinnati. In measuring this with the 18½-inch I found that the principal star was also double. There are but few measures of the Struve pair. In 1864 Dembowski was unable to see the companion. It was called "extremely difficult" by OΣ in 1876. $55^{m}\ 58^{s}$

So far there is no evidence of relative motion in either of the new pairs.

A and B

1880.13	350°7	1″43	5*n*	β
1890.61	350.0	1.60	3*n*	β
1898.73	350.1	1.72	3*n*	Bd
1905.52	349.1	1.34	2*n*	β

C and D (= Howe 45)

1880.13	262°7	2″90	5*n*	β
1890.61	260.1	3.24	3*n*	β
1898.73	261.2	3.77	3*n*	Bd
1905.51	260.3	3.11	1*n*	β

A and C

1880.58	20°7	10″73	3*n*	β
1890.61	19.8	11.06	3*n*	β
1898.73	20.7	11.10	3*n*	Bd
1905.52	18.4	10.95	2*n*	β

A and D (= Σ 2435)

1827.67	12°3	10″25	2*n*	Σ
1880.16	5.9	9.84	3*n*	β
1890.60	12.2	10.10	2*n*	β
1898.73	4.2	10.07	3*n*	Bd
1905.52	0.6	9.77	2*n*	β

[β (**XIII**)...β³...β (3048)(*Pub L. O.* **II**)(*Ast. Reg.* **XIX**, 120)...Cin⁵...Boothroyd (*A. J.* 478)...Ma (*F. S.* **II**)...H (**VII**)...Δ (1736)...OΣ (**X**)...β⁶...]

8974. **Egbert 7.** From Cin⁵. Must be near H 5082. 56 :

8975. **H 5082.** Probably fixed. 56 1

AB	1878.62	88°2	7″40	2*n*	Cin	6.0... 9.5
	1897.73	89.2	7.35	1*n*	See	
AC	1878.62	111.4	19.63	2*n*	Cin	...10.7
	1897.73	112.2	20.69	1*n*	See	

[Cin⁴...Cin⁵...Glasenapp (**I**)...See (3496)...]

8976. **H 2849.** Nothing later but the following: 56 3

1879.45	142°6	20″24	1*n*	Cin	9.0...11.0

8977. **Σ 2440.** *Draconis* **223.** B. A. C. 6508. Fixed. 56 5

1867.65	123°9	16″90	4*n*	Δ
1903.58	122.2	16.78	2*n*	Espin

[H (**V**)...Bl (**V**)...Δ (**II**)...Glasenapp (**IV**)...Espin (*Mon. Not.* **LXIV**, 677)...]

(See p. 1080)

8979. **Σ 2432** *rej.* There is a 14 m star, 164°2 : 20″3. The only measure of the Struve companion is: 56 14

1904.41	87°0	14″64	2*n*	β⁶	7.5...10.0

$56^m 18^s.5$ **8981.** **♅ IV. 93.** "Identification precarious." There is no pair in this place. It is identical with Σ 2431.

56 21 **8982.** **Ho 92.** Unchanged.

1897.03	39°.2	1″.00	3*n*	Ho
1902.55	38.8	1.10	4*n*	Doo

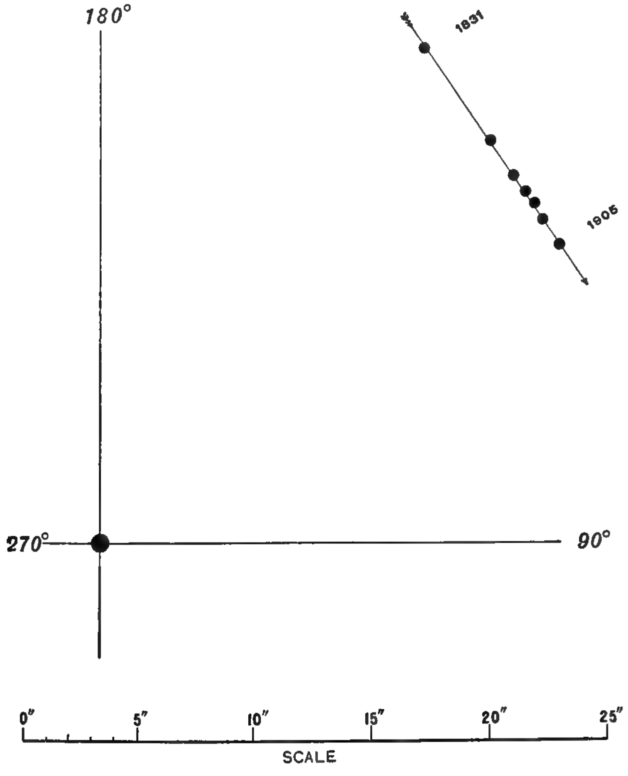
[Ho (2778, 3234, 3558)...]

56 24 **8983.** **Σ 2436.** Distance decreasing very slowly, evidently from proper motion. The annual movement is about 0″.03.

1830.35	309°.0	34″.58	5*n*	Σ
1843.73	310.2	34.14	2*n*	Ma
1852.63	310.2	33.84	1*n*	Ma
1864.80	310.2	33.50	5*n*	Δ
1877.11	311.0	33.44	9*n*	Je
1880.58	310.2	33.00	2*n*	β
1890.51	310.8	32.51	2*n*	Gla
1905.23	311.2	32.42	2*n*	β

[Ma (*F. S.* I)...Ma (**XI, XIII**)...WS...WS2...Gl...Δ (1573)...Δ (**II**)...Cin5... β3...Je (2407).... de Ball (2753).... Glasenapp (I, III).... *Annals Toulouse Obsy.* **III**...β6...]

56 34 **8986.** **Σ 2434.** (AB = **Sh 285.**) The change in the position of the double companion is due to the proper motion of A.

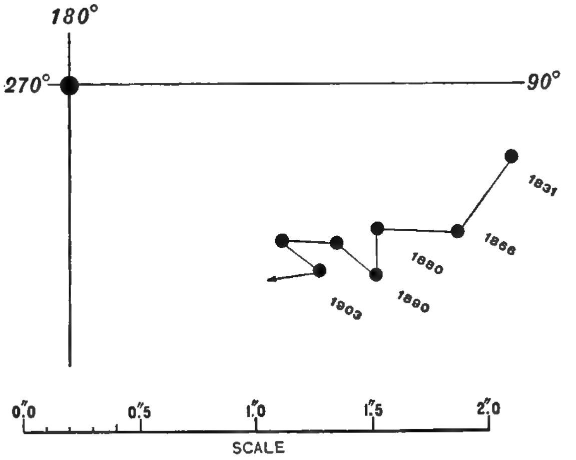


Σ 2434. AB.

This is given from meridian observations, 0″.117 in 180° (*A. G. Nico.*). The measures give 0″.14 and a larger position-angle. The relative change in the components of the close pair may be from orbital motion.

A and B

1831.57	147°.0	25″.56	4*n*	Σ
1866.58	136.1	24.18	4*n*	Δ
1880.64	131.8	23.84	2*n*	β
1885.14	129.7	23.82	6*n*	Hl
1890.63	128.2	23.83	4*n*	Giacomelli
1896.49	126.3	23.59	3*n*	A
1905.53	123.1	23.52	2*n*	β



Σ 2434. BC.

B and C

1831.57	80°.5	1″.93	3*n*	Σ
1866.58	69.2	1.79	4*n*	Δ
1880.59	64.9	1.46	3*n*	β
1890.78	57.9	1.55	2*n*	Hl
1896.47	59.4	1.32	2*n*	Lv
1896.49	53.8	1.12	3*n*	A
1903.73	53.4	1.33	2*n*	Biesbroeck

[Ma (*F. S.* **I**, 36, 187)...Ma (**XI, XIII**)...Mh...Se...Se2...Ra (**XXI, XXIX**)... Ferguson (*Wash. Obsns.* 1863)...Flm...Δ (1573)...Δ (**II**)...Giacomelli (**III**) ...WS...WS2...Gl...Sk...Hl (*Wash. Obsns.* 1884–85)...Hl (**I, II**)...Cin4 ...Cin5...Cin6...LM...En (2742)...Sp (**II**)...β1...β3...T (2991, 3185)... A (3396)... Lv (*A. J.* 407)... Collins (*A. J.* 378)... Solá (3529, 3679)... Brown (3646)...HΣ (**XII**)...Sk5...Biesbroeck...β6...]

8987. **Ho 93.** The only other measure is: $56^m 36^s$

1892.76	333°.7	0″.98	1*n*	Ho

[Ho (2778, 3234)...]

8988. **Σ 2437.** Perhaps binary, but the motion is very slow. 56 38

1830.79	80°.8	1″.08	5*n*	Σ
1843.51	73.0	0.93	2*n*	Ma
1864.40	70.7	0.85	5*n*	Δ
1882.62	66.2	0.86	5*n*	Hl
1887.61	62.8	0.81	5*n*	Sp
1888.83	62.3	0.92	12*n*	HΣ
1895.63	59.8	0.80	2*n*	Collins
1902.74	63.2	0.80	2*n*	Do
1903.55	59.7	0.76	3*n*	Bowyer

[Ma (*F. S.* I)... Ma (**X, XI, XIII, XV**)... H (**V**)...Se...Se2...Hd... En (1518, 1674, 2786)...Δ (1474)...Δ (**II**)...OΣ (**IX**)...Flm...Du...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...WS...WS2...Gl...Sk...Per...Per (2559, 2748)... UL...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Sp (2133)...Sp (**II, II** App.)... Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803)...Glasenapp (**V**)... HΣ (**XII**)...Maw (**IV**)...Sk5...Do (3931)...Biesbroeck...]

$56^m\ 41^s$ **8989.** **H 2851.** "Noticed by Σ as near Σ 2437, but not described by him as double." Easy with 6-inch (1875).

AB	1879.35	120°3	17″23	2*n*	Cin	7.7...12.0
	1904.46	126.8	16.28	2*n*	β	7.7...11.0
AC	1879.37	303.0	43.15	1*n*	Cin	...10.0
	1904.46	300.8	43.86	1*n*	β	

[Cin^5...Big (*Bul. Ast.* **XII**, 299)...β^6...]

56 44 **8990.** **H 1361.** "The chief star in a cluster." In W^2 8 m. The only measure is:

1905.39	161°3	18″37	2*n*	β^6	8.5...10.8

Another pair in the vicinity, not previously seen, was measured for H 1361. This is DM (28°) 3186, $4^m\ 25^s$ *f* and 11′ *s* of the H star.

1905.24	181°0	5″75	1*n*	β^6	8.5...11.8

57 0 **8991.** **H̥ N. 129.** (= **Hd 151.**) Decl. in H 10′ in error. In O. Arg. S. "duplex." No motion.

1877.57	307°2	8″12	2*n*	Cin	7.5...8.8
1896.62	307.7	8.14	1*n*	A	

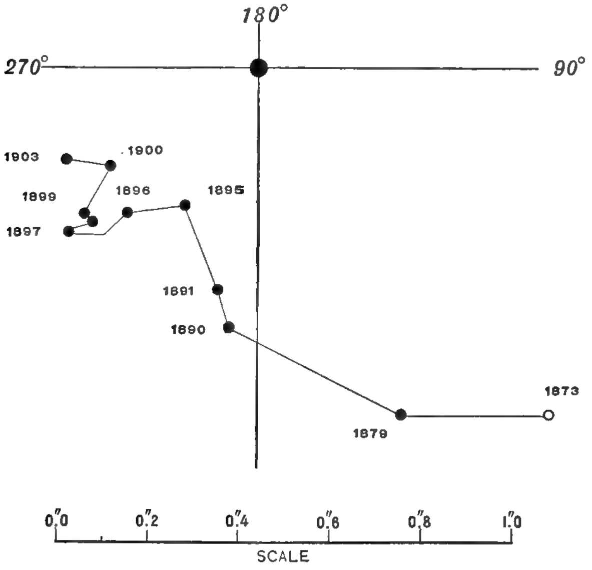
[Hd... Cin^4...Glasenapp (**I**) (*A. J.* 241)...A (3396)...See (3496)...]

57 3 **8992.** **See 368.** The other measures are:

1899.63	306°1	16″40	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

57 10 **8993.** **H̥ N. 126.** (= **Hu 261.**) A most interesting system; in a low-power field with *o Sagittarii*. It seems to have been entirely overlooked for three-fourths of a century after discovery, so that the motion through one quadrant only has been under observation. The period and other elements of the orbit will necessarily be uncertain probably for another century.



H̥ N. 126.

The system has a considerable proper motion:

Bossert	0″114 in 150°9
Paris	0.111 in 154.0

The following are all the measures:

1801.67	"Very close"			H̥	
1873.00	40° ±	1″ ±		β	
1879.53	22.4	0.83	2*n*	Cin	7.5...8.0
1890.48	353.2	0.58	3*n*	β	7.8...7.9
1891.51	349.3	0.48	3*n*	β	
1895.61	331.6	0.35	6*n*	Barnard	
1896.73	317.5	0.44	2*n*	A	
1897.75	310.7	0.56	1*n*	See	
1898.46	312.8	0.51	3*n*	A	7.3...8.0
1899.55	310.0	0.51	2*n*	A	
1900.75	303.2	0.40	3*n*	Hu	7.8...7.8
1900.77	289.7	0.5±	1*n*	Solá	
1903.41	295.4	0.48	2*n*	A	

[Cin^5...β (3048, 3114)(*Pub. L. O.* **II**)...Barnard (*A. J.* 447)...Hu (*A. J.* 494)... A (3396, 3585, 3639)*Bul. L. O.* No. 11)...See (3496)...Solá (3679)...]

(See p. 1080)

8994. **H 2852.** "*Red: blue-green.*" The only measure is: $57^m\ 16^s$

1901.55	131°3	22″52	2*n*	β^5	9.1...9.9

8995. *o Sagittarii.* **See 369.** Other measures at the Lowell Observatory give: 57 29

1899.68	238°1	33″61	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

8997. **Σ 2452.** *Draconis* **233.** (= **H̥ II. 31 = S 713.**) Without change. 57 35

1866.22	218°8	5″64	3*n*	Δ
1899.75	218.0	5.71	3*n*	Hu

[Ma (*F. S* **I**) ... Ma (324) ... Ma (**XI, XIII**) ... Wr ... Δ (*Mem. Accad. Sci.*)... Δ (1032)....Δ (**I**, pp. 90, 404)(**II**)....Ra (**XXIII**)....Se....Hl (*Wash. Obsns.* 1876)...Hl (**I**)...OΣ (**X**)...Cin^5...Pt...Kustner (2584)...En (2662)...de Ball (3017)...Com (**VI, X**)...Glasenapp (**I, III**)...]

8998. **Ho 94.** Fixed. 57 36

1902.70	314°9	7″21	5*n*	Doo

[Ho (2778, 3558)...]

8999. 16 *Lyrae.* **H 1362.** In another observation H estimates distance 50″. The only later observations are: 58 3

1879.33	276°3	41″93	2*n*	β^3	6.0...11.5
1905.38	278.6	42.67	2*n*	β^6	...11.5

9000. **Σ 2441.** (= **H̥ I. 60.**) The measures do not cover a sufficient time to give the nature of the movement, as the change is very slow. The angle in H̥ is evidently too small. (See No. 9008). 58 7

1783.10	286°8	....	1*n*	H̥
1830.34	291.9	5″22	3*n*	Σ
1843.77	288.7	5.09	2*n*	Ma
1857.13	285.3	5.64	1*n*	Se
1870.40	283.7	5.25	5*n*	Δ

1879.93	281°4	5″33	4*n*	Sp
1884.68	281.3	5.49	3*n*	Hl
1890.70	279.4	5.19	3*n*	Maw
1896.51	278.9	5.44	2*n*	Hu
1903.56	278.2	5.61	2*n*	Do
1905.71	279.3	5.47	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Se...Se^2...OΣ (**IX**)...Δ (2195)...Δ (**II**)... Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (3023, 3931) ... Flm...Bl (**V**) ...Ferr...Big...Per... Per (2748)...Sp (**II**)...Hl (*Wash. Obsns.* 1884-85)... Hl (**I, II**)... Ho (2978) ... T (2991) ... Maw (**I, IV**) ... β (*Mon. Not.* **XXXIV**, 378)... Hunt (*Observatory* **IV**, 221) ... Hu (*A. J.* 397) ... Glasenapp (**V**)... HΣ(**XII**)...Biesbroeck...β^6...]

$58^m 20^s$ **9001. Σ 2442.** Rectilinear motion. The distance is decreasing, the angle remaining sensibly unchanged. The measures give for the proper motion of A, 0″064 in the direction of 207°5. In some three hundred years these stars will form a very close pair. The following are all the measures:

1828.77	207°6	23″05	2*n*	Σ
1843.70	207.2	23.56	1*n*	Ma
1864.60	207.6	21.01	2*n*	Δ
1866.91	208.1	20.69	2*n*	Δ
1870.41	207.4	20.59	1*n*	Δ
1877.67	207.4	19.94	3*n*	Sp
1901.50	206.4	18.28	2*n*	β
1903.89	207.5	17.98	2*n*	Biesbroeck
1905.76	207.9	18.14	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**)...Δ (1573)...Δ (**II**)...Flm... Sp (**II**)...Biesbroeck... β^5...β^6...]

58 32 **9002. Σ 2439.** Fixed.

1866.70	199°6	22″12	3*n*	Δ
1905.54	199.2	22.00	2*n*	β

[Δ (**II**)... Cin^5...Glasenapp (**III**) ...β^6...]

58 32 **9003. Σ 2444.** Rectilinear motion.

1829.74	321°5	24″78	3*n*	Σ
1868.30	318.9	24.02	4*n*	Δ
1902.56	316.2	23.42	2*n*	β

These measures give 0″037 in 22°1 for the most probable proper motion of A.

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...β^6...]

58 36 **9004. Σ 2443.** Unchanged.

1895.96	312°2	6″63	3*n*	Δ
1905.75	312.2	6.65	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se...Δ (**II**) ...T (3185)... Glasenapp (**III**) ...*A. G. Leipzig*, p. 210...*Annals Toulouse Obsy.* **III**...β^6...]

58 38 **9005.** 15 *Aquilae*. **Sh 286.** (= **H V. 33** = σ **603.**) The proper motion of the large star is very small, 0″014 in 239°7 (Auwers). The following are all the observations:

1781.56	.....	33″88	1*n*	H	
1823.54	206°7	35.62	2*n*	Sh	
1855.10	207.5	.....	1*n*	P	
1869.6	207.1	37.16		Ra	
1883.66	207.8	37.12	4*n*	Gla	5.0...7.3
1900.46	208.3	37.23	2*n*	β	6.0...8.0

[P1...Ra (**XXIX**)...Glasenapp (**III**) ...β^6...]

9006. H 5507. Companion very distant, perhaps 50″ (1876). Recently measured, the 40-inch showing a 14 m star about the same distance in 94°8. $58^m 49^s$

1900.92	63°1	46″93	2*n*	β^5	6.0...12.2

9007. β 974. Discovered with the 18½-inch. There is a 12 m star about 25″ distant in 100°. All the other measures are given. 58 53

1891.40	84°4	0″96	2*n*	β	9.0...9.2
1898.69	87.5	0.91	3*n*	Bd	8.2...9.8
1901.59	84.3	0.96	3*n*	Doo	9.0...9.4

[β (**XIII**) ...β^3...β (3114) (*Pub. L. O.* **II**)... Boothroyd (*A. J.* 478) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

9008. H I. 60. Place uncertain in H. There is no pair in this place. It is certainly identical with Σ 2441. (No. 9000.) 58 54

[β (*Mon. Not.* **XXXIV**, 378)...Hunt (*Observatory* **IV**, 221)...]

9009. β 52. Discovered with the 6-inch. The distances are too great to make it an object of any special interest. In the field with Σ 2444. 58 54

BC	1898.73	171°5	8″90	5*n*	Doo	10.3...11.2
AB	1898.73	299.8	51.66	5*n*	Doo	8.6...

[β (**I**) ... β (*Mon. Not.* **XXXIII**, 351) ... Lv (*A. J.* 407) ... Doolittle (*Pub. Flower Obsy.* **I**)...]

9011. Hu 757. (AB = **Σ 2450.**) Since Part I was in type, Hussey has found that the smaller star of Σ 2450 is a close pair. 59 18

B and C

1904.53	93°2	0″23	2*n*	Hu	10.0...10.2

No material change in the wide stars.

A and BC

1867.11	301°9	5″04	4*n*	Δ
1904.64	301.2	5.38	3*n*	Duncan
1905.72	300.8	5.17	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Hu (*Bul. L. O.* No. 65)...β^6...]

(See p. 1080)

$59^m\ 22^s$ **9012.** **Σ 2448.** (= **𝕳 I. 59 = S 712.**) Fixed.

1868.52	192°1	2″41	4*n*	Δ
1888.77	191.8	2.29	3*n*	T
1894.70	193.3	2.49	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (1209)...Δ (**I, II**)...WS²...Ferr...Bl (**V**)...T (2991)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**)...]

59 31 **9013.** **β 1285.** In my Mt. Hamilton observing book of May 27, 1892, this star was noted with the 36-inch, "possibly a close pair. There is a faint star 10″ or 12″ *p*." I have looked at this a number of times with the 40-inch, and measured the distant companions as given in Part I, but cannot say whether or not the large star is a close pair. Further observations with a large aperture are necessary to settle this point. Aitken found the principal star single 1899.44 with the 36-inch on a good night with power of 1000.

59 34 **9014.** **β 466.** Discovered with the 6-inch. Probably unchanged.

1891.77	165°9	1″84	2*n*	β	8.5...9.0
1904.06	163.0	2.01	6*n*	Doo	8.7...9.7

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β (3114) (*Pub. L. O.* **II**)...Δ (**I**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

59 35 **9015.** **Σ 2445.** *Vulpeculae* 1. Fixed.

1867.27	263°1	12″25	4*n*	Δ
1891.60	262.8	12.28	4*n*	Gla
1901.78	263.4	12.70	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...H (**V**)...Ra (**XXIII**)...Δ (1194)...Δ (**I, II**)...T (2898)...Glasenapp (**I, III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)....]

59 36 **9016.** **H 1364.** "A most elegant double star; chief of a small cluster." The estimated distance in H is too small as usual in stars of this class.

1881.45	206°9	3″26	3*n*	β^4	9.7...9.9
1901.94	206.2	3.05	2*n*	β^5	9.4...9.4

59 45 **9018.** **Bird 4.** Discovered by F. Bird in 1862. No motion.

1903.53	315°3	2″53	3*n*	β	8.5...8.6

[β^4...Hunt (*Observatory,* **IV**, 221)...Lohse (*Pub. Potsdam Obsy.*)...β^6...]

59 54 **9020.** ζ *Aquilae.* **β 287.** Discovered with the 26-inch at the Naval Observatory. Auwers gives the proper motion of ζ *Aquilae,* 0″096 in the direction of 196°7. If the small star was stationary, in twenty years its position-angle would diminish 10°, and the distance increase 1″7 by virtue of the proper motion of A. It is obvious from the measures that the two are moving together, as there has been no sensible relative change.

1878.90	59°7	5″95	3*n*	OΣ
1879.08	61.1	5.55	3*n*	Hl
1879.53	60.1	4.74	4*n*	β
1886.89	59.5	5.75	8*n*	HΣ
1889.43	57.3	5.63	3*n*	β
1896.64	56.8	5.87	4*n*	Lewis
1898.61	59.0	5.98	3*n*	Doo
1905.76	55.6	5.38	1*n*	β

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β^3...β (2957) (*Pub. L. O.* **II**)...Newcomb (*Wash. Obsns.* 1874)...OΣ (**X**)...Hl (**I, II**)...HΣ (**XII**)...Barnard (*A. J.* 447)...Doolittle (*Pub. Flower Obsy.* **I**)...Lewis (*Mon. Not.* **LIX**, 400; **LXII**, 383)...β^6...]

(See p. 1080)

9021. **Σ 2446.** (= **𝕳 III. 108.**) Fixed. $59^m\ 56^s$

1867.80	153°7	9″85	4*n*	Δ
1880.59	153.1	9.78	1*n*	β
1901.52	154.1	9.79	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Ra (**XXI**)...Wr...WS...Gl...Δ (**II**)...β^3...Glasenapp (**I, II, III**)....Maw (**I**)....Solá (3529)....*A. G. Leipzig,* p. 249....*Annals Toulouse Obsy.* **III**...]

9022. **S 710.** Apparently fixed. 59 58

1877.59	1°3	6″27	3*n*	Cin	6.8...8.5
1900.55	1.2	6.27	4*n*	Doo	5.8...8.9

[H^1....H (**V**)....*Wash. Obsns.* 1862....Cin^4....Lv^1....Doolittle (*Pub. Flower Obsy.* **I**)...Scott (*Mon. Not.* **LXIV**, 52)...]

9023. **Σ 2451.** The change, if any, is very little. The proper motion is given 0″087 in 64°2 (*A. G. Harvard*). 0 4

1844.37	64°4	2″50	2*n*	Ma
1867.94	62.7	2.26	3*n*	Δ
1888.77	64.6	2.37	1*n*	HΣ
1895.65	69.0	2.36	2*n*	Gla
1899.54	69.8	2.05	1*n*	Lewis
1905.72	67.2	2.15	1*n*	β

[Ma (**XI, XIII**)...Ma (*F. S.* **I**)...Δ (**II**)...Glasenapp (**IV**)...Lewis (*Mon. Not.* **LX**, 510)...HΣ (**XII**)...β^6...]

9024. **β 359.** Discovered with the 6-inch. Probably fixed. 0 7

1891.77	86°4	3″84	2*n*	β
1899.16	81.3	4.23	7*n*	Doo
1905.35	80.3	4.33	3*n*	Doo

[β (**VI**)....β (2062, 3114) (*Pub. L. O.* **II**)....Δ (**I**)....Doolittle (*Pub. Flower Obsy.* **I**)...]

9025. **H 1365.** "*Ruddy: green by contrast.*" The only measures are: 0 22

1901.83	325°8	20″35	2*n*	β^5	9.5...11

9026. **Σ 2447.** *Aquilae* 39. (= **𝕳 N. 127.**) Without change. The place of 𝕳 N. 127 is given by 𝕳 the same as that of Σ 2434. That is an error; it is identical with Σ 2447. In 1875, and at later times, I suspected with the 6-inch an elongation of the principal star, but could not verify it. In 1891 it was perfectly round with the 36-inch. 0 22

1866.29	344°0	13″91	3*n*	Δ
1878.10	343.8	14.06	2*n*	Cin
1905.72	344.0	14.00	1*n*	β

The 36-inch showed a 14 m star in the direction of 180°, with distance a little less than the Σ companion. The only measure is:

1905.72	190°0	13″90	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VII**)...Mh...Δ (**II**)...Hl (*Wash. Obsns.* 1863)... Hl (**I**, p. 134)... Cin^{4}... Cin^{5}... Glasenapp (**I**) ... β (3114)(*Pub. L. O.* **II**) ... *Annals Toulouse Obsy.* **III**...β^{6}...]

0^m 33^s **9027.** **Ho 441.** Nothing later but the following:

1904.42	198°7	1″52	3*n*	Doo

[Ho (3234)...]

0 33 **9028.** **Σ 2449.** (= **H III. 109** = **Sh 287.**) Fixed.

1867.83	291°8	7″91	4*n*	Δ
1890.34	292.1	7.93	5*n*	Giacomelli
1892.68	290.9	8.03	2*n*	Gla

[Ma (**XI, XIII**)...Ma (324)...Ma (*F. S.* **I**)...Wr...Se...Wr (*Phil. Trans.* 1851) ....Ra (**XXIII**)....Δ (1194)....Δ (**I, II**)....Je (2407)....Giacomelli (**III**).... Glasenapp (**I, II, III**)...Solá (3529)...*Annals Toulouse Obsy.* **III**...]

0 35 **9029.** **Da 9.** Discovered by Dawes with his 8¼-inch refractor in 1859. Without change.

1875.16	179°2	1″88	6*n*	Δ
1889.09	177.5	2.02	2*n*	HΣ

[Da^{4}... Da (*Mon. Not.* **XXIV**, 117) ... Δ (**I**) ... OΣ (**X**)... WS... Sk^{2}...Sp (2133) ...Sp (**II**)...HΣ (**XII**)...Sk^{5}...]

0 41 **9030.** **S 711.** Probably fixed. The only measures since South are:

1880.38	123°4	45″87	1*n*	Cin^{6}	7.5...8.5
1905.72	123.7	45.72	4*n*	Doo	7.3...8.6

0 49 **9032.** **Ho 95.** No change since 1885.

1896.22	220°6	0″35	2*n*	Ho
1901.63	219.2	0.33	2*n*	A
1904.49	224.2	0.37	3*n*	Doo

[Ho (2778, 3234, 3558) ... A (*Bul. L. O.* No. 11) ... Doolittle (*Pub. Flower Obsy.* **II**)...Bowyer (*Mon. Not.* **LXVI**, 29)...]

1 5 **9034.** **H 2854.** The only measures are:

1904.65	55°2	7″18	3*n*	Miller	9...11
1905.53	51.8	7.80	1*n*	β^{6}	9...11

1 7 **9035.** **Σ 2453.** No material change.

1867.27	96°4	14″62	4*n*	Δ
1887.72	94.7	14.41	2*n*	HΣ

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**)... H (**IV, V**) ... Δ (**II**) ... Sp (**II**) ... Cin^{5}... HΣ (**XII**)...]

1^m 11^s **9036.** **Ho 96.** Fixed.

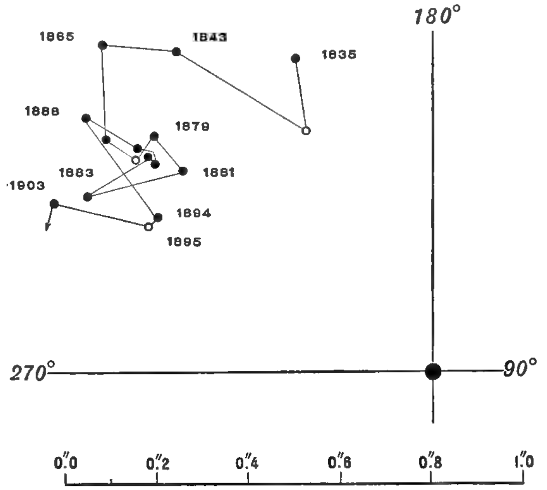
1904.42	133°3	3″04	3*n*	Doo

[Ho (2778, 3234)...]

1 14 **9037.** **A. G. 227.** Double in *A. G. Lund.* Measures by β^{6}.

1904.65	4°0	5″58	3*n*	Espin	8.7...9.1

1 30 **9038.** **Σ 2454.** Change. The measures are hopelessly discordant for a pair of this class, and show nothing but some change, the amount and character of which is wholly uncertain.



Σ 2454.

On two occasions OΣ measured another pair, apparently in the same vicinity, 157°9 : 0″55 : 7.5...8.7 (1841.62) 2*n*, which he was unable to identify afterwards. This may be Ho 99 (No. 9060). I could not find anything else with the 36-inch in 1890.

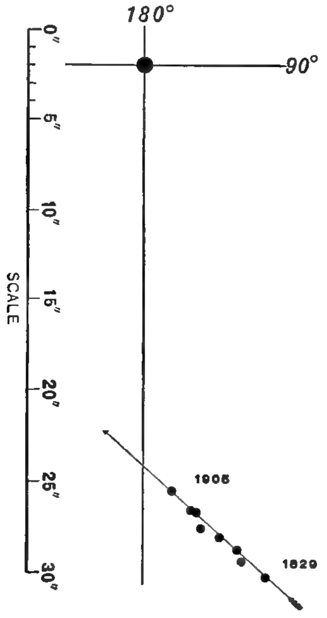
1835.50	204°0	0″75	3*n*	Σ
1843.76	208.1	0.6 ±	2*n*	Ma
1843.76	219.3	0.90	3*n*	OΣ
1865.32	226.0	1.02	2*n*	Δ
1869.64	235.1	0.88	2*n*	OΣ
1875.89	235.0	0.8 ±	4*n*	Sp
1879.62	230.4	0.80	3*n*	Hl
1881.59	231.7	0.70	2*n*	Ho
1883.39	243.6	0.85	8*n*	En
1883.63	233.6	0.78	3*n*	Per
1884.67	233.8	0.76	3*n*	Hl
1885.54	233.6	0.81	2*n*	Per
1888.61	234.4	0.94	5*n*	HΣ
1894.13	241.5	0.69	3*n*	Com
1895.59	243.7	0.7 ±	2*n*	Gla
1903.57	246.6	0.91	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Se... Se (*Comp. Rend.* **XLVIII**, 375)...Du... Flm... Δ (1573)...Δ (**II**)...OΣ (**IX**)...WS...WS^{2}...Sk^{3}...Newcomb (*Wash. Obsns.* 1874)...Hl (*A. J.* 302)(**I, II**)...Do (2303, 3931)...Sp (2133)...Sp (**II**)...Per... Per (2559, 2748)...En (2677)...UL...Ho (2978)...Com (**X**)...Glasenapp (**IV**) ....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIV**, 803)...HΣ (**XII**)...]

$1^m\ 32^s$ **9039.** Arg. 33. "Duplex" in O. Arg. N. Examined and estimated, 70°: 15″: 8...9.5 (1875). The only measures are:

1904.44	58°0	10″52	2*n*	β^6	8.2...8.7

1 40 **9041.** Σ 2456. The motion is rectilinear. The apparent movement of B is 0″092 annually in the direction of 228°. As the stars are sensibly equal in magnitude, and there are no suitable measures connecting either with a third star, it is impossible to say which of the components is moving.



Σ 2456.

1829.43	13°6	29″07	3*n*	Σ
1850.81	11.4	28.00	1*n*	Ma
1852.02	11.2	27.34	3*n*	Ma
1865.21	9.3	26.44	5*n*	Δ
1880.21	7.3	25.37	4*n*	Sp
1883.78	6.8	24.95	6*n*	En
{1888.00	6.3	24.85	4*n*	HΣ
{1888.59	6.1	24.83	2*n*	Hl
1903.54	4.0	23.67	2*n*	Do
1905.42	3.9	23.64	3*n*	β

HΣ adds an excessively faint star near A.

AC	1888.21	96°6	21″30	1*n*	HΣ	...13.5
	1905.72	97.3	20.52	1*n*	β	...15.5
BD	1905.72	5.3	61.76	1*n*	β	

It might be inferred from the measures of C that the proper motion is in the principal star A, but the small differences shown in the two positions may not be real, as this star is exceedingly faint in the 40-inch.

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...H (**IV**)...Ra (**XXV**)...Flm...En (1518, 1674, 2677)...Δ (1573)...Δ (**II**)...Sk²...Do (2199, 2242, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (**II**)...Hl (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^6...]

9042. H̥ V. 103. (= σ 607.) There appears to be no change in the last sixty years. The distance by Espin of 45″52 in 1900 is probably a misprint for 55″52. $1^m\ 42^s$

1783.63	60°6	45″53	1*n*	H̥	
1840.83	55.6	54.58	1*n*	OΣ	7.8...9.2
1866.68	55.5	55.08	1*n*	OΣ	
1901.26	55.4	55.64	2*n*	β	8.0...8.3

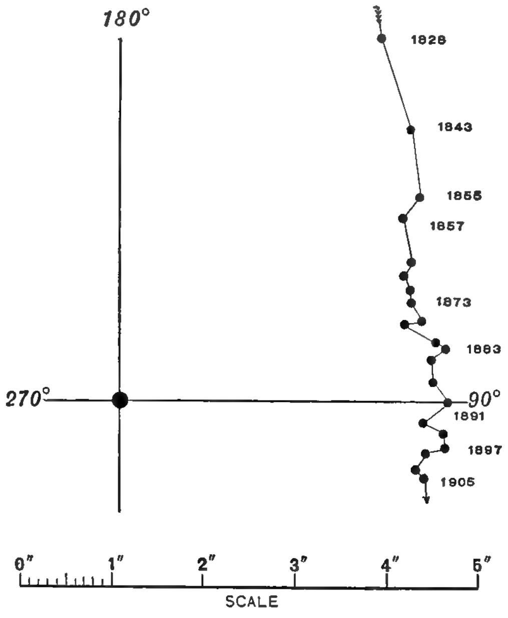
[OΣ (**X**)...Espin (*Mon. Not.* **LXII**, 532)...β^5...]

9043. Σ 2455. The change is due to proper motion. The direction of this movement of A as derived from meridian observations is incorrect unless the smaller component has some motion of its own. 1 47

A. G. Berlin	0″073 in 214°8
Measures Σ — β	0.064 in 185.5

The following epochs are shown on the diagram:

1828.77	144°5	4″93	3*n*	Σ
1843.62	133.4	4.39	3*n*	Ma
1855.66	124.3	3.98	3*n*	Wr
1857.29	123.0	3.70	3*n*	Se
1864.96	115.5	3.53	6*n*	Δ
1867.69	113.9	3.41	5*n*	Δ
1869.95	110.9	3.41	6*n*	Du
1873.34	108.7	3.37	3*n*	Δ
1875.61	104.8	3.43	4*n*	Sp
1876.01	105.1	3.25	3*n*	Δ



Σ 2455.

1879.66	100°5	3″53	2*n*	Hl
1883.16	99.1	3.61	6*n*	En
1884.61	97.5	3.45	3*n*	Hl
1888.18	93.5	3.45	9*n*	HΣ
1891.21	89.8	3.60	5*n*	Maw
1894.12	85.9	3.36	6*n*	Com
1895.60	84.0	3.58	2*n*	Collins
1897.93	81.8	3.62	3*n*	Gr. Obsy.
1900.96	80.1	3.40	6*n*	Bowyer
1903.25	76.8	3.35	5*n*	Bowyer
1905.27	75.7	3.44	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**VII**)...Wr...Se...Se²...Hd...Flm...En (1674, 2677)...Sp (2133)...Sp (**II**)...Big...Δ (1579, 1736, 2081)...Δ (**II**)...Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk...Sk²...Sk³...Sk⁴....WS....Du (pp. xxvii, 114, 232)....Pl....Hl (*Wash. Obsns.* 1884)....Hl (**I, II**)...Hl (*A. J.* 302)...Per....Per (2559)...de Ball (2753)...T (2898)...Maw (**I, II, IV**)....Glasenapp (**III**)....Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....Com (**X**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 511; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29)....*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Thiele (3837)...Biesbroeck...β⁶...]

1^m 52^s **9044.** **Ho** 97. (AC = **H** 1366.) H found for AC, 57°.8: 10″±: 9–10...12 (1828+). No change in AB.

1895.75	21°.4	0″.51	3*n*	Ho
1904.49	26.5	0.66	3*n*	Doo

[Ho (2778, 3234, 3558)...]

2 3 **9045.** Σ 2457. Fixed.

1867.63	200°.7	10″.11	4*n*	Δ
1892.56	200.3	10.27	4*n*	Gla

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**V**)....Δ (**II**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)....T (2898)....Glasenapp (**III, IV**)....Collins (*A. J.* 378)....*Annals Toulouse Obsy.* **III**...]

2 4 **9046.** Σ 2458. Without change. Σ refers to a distant 7.8m star.

1866.92	227°.8	11″.13	3*n*	Δ
1895.65	227.2	11.36	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III**...]

2 9 **9047.** A 94. No other measures.

[A (3668)...]

2 20 **9048.** A 262. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

2 28 **9049.** Σ 2459. Without chang

1866.92	233°.0	13″.66	3*n*	Δ

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Cin⁵...*Annals Toulouse Obsy.* **III**...]

2 29 **9050.** **H** 876. These are all the measures:

1904.60	4°.0	31″.06	3*n*	Miller	9 ...11
1905.63	6.0	29.76	2*n*	β⁶	8.2...11.5

2 30 **9051.** Σ 2463. C from H (IV); another observation, 279°.9: 18″±. I found distance not less than 20″ (1876). In Cin⁵ is a faint pair, 300°.2: 18″.44: 9.5...9.5 (1879.52) 1*n*, erroneously called Σ 2463 unless it is the H star. No change in B unless a small decrease in the angle.

1866.66	7°.4	9″.47	3*n*	Δ
1901.57	5.4	9.46	2*n*	β

The only measure of the Herschel star is:

1901.57	282°.7	23″.74	2*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...Δ (**II**)...Cin⁵...Espin (*Mon. Not.* **LXII**, 530)...β⁶...]

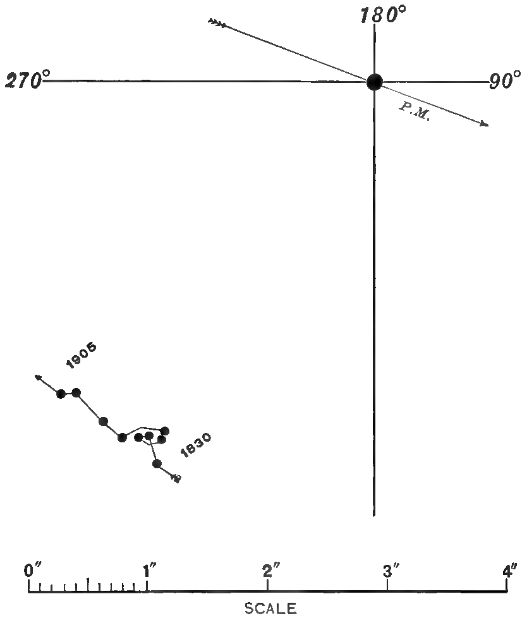
9052. Σ 2460. Fixed. 2^m 45^s

1867.30	199°.7	9″.08	3*n*	Δ
1894.54	198.3	9.09	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin⁵...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

9053. 17 *Lyrae.* Σ 2461. The principal star has a proper motion of 0″.112 in 68°.5 (Auwers), and the companion seems to be moving in nearly the same direction at a little smaller rate, indicating a pair of the 61 *Cygni* type. 2 53

1830.72	330°.6	3″.72	3*n*	Σ
1843.76	327.9	3.55	2*n*	Ma
1848.55	326.8	3.71	1*n*	Da
1851.78	329.6	3.53	2*n*	OΣ
1856.82	329.4	3.45	2*n*	Se
1865.63	325.1	3.69	3*n*	Δ
1873.70	321.6	3.68	2*n*	Δ
1888.47	316.3	3.66	3*n*	HΣ
1905.72	315.0	3.74	3*n*	β



17 Lyrae. Σ 2461.

Engelhardt measures several distant stars in the field. There seems to be change in the distance of the nearest.

AC	1894.85	69°.2	112″.31	2*n*	Eng	...11
	1905.72	66.4	127.59	3*n*	β	
AD	1887.73	296.4	124.34	2*n*	Eng	... 9.0
	1894.85	296.0	125.32	2*n*	Eng	
	1905.72	295.7	126.12	1*n*	β	
AE	1891.33	116.2	152.42	2*n*	Eng	...10.0
	1905.72	116.5	150.75	1*n*	β	
AF	1891.29	357.6	168.15	4*n*	Eng	... 9.6

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Da²...Da³...H (**IV**)...Se...Flm...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2242, 2303)...Bru²...WS...Bl (**V**)...OΣ (**IX**)...Δ (2195)...Δ (**II**)...de Ball (2753)...Per...Per (2559, 2748)...Engelhardt (**II, III**)...Maw (**I**)...HΣ (**XII**)...β⁶...]

3^m 4^s **9054.** **Σ 2478.** Perhaps some change in the angle.

1869.21	293°5	1″16	4*n*	Δ
1894.63	297.0	1.21	2*n*	Gla
1899.52	303.2	1.16	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LX**, 510)...]

3 8 **9055.** **Σ 2465.** Without change. A wide pair 11′*n* in Cin⁵, 240°0 : 26″23 : 10.0...10.0 (1879.36) 1*n*.

1869.12	249°4	1″14	4*n*	Δ
1881.60	252.5	1.08	5*n*	Ho
1904.57	252.8	0.94	1*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...Cin⁵...Ho (2978)...Com (**X**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

3 13 **9056.** **Σ 2466.** Without change.

1868.87	107°3	2″38	4*n*	Δ
1881.60	104.8	2.39	2*n*	Ho
1892.04	104.4	2.55	4*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Ho (2978)...Glasenapp (**III**)...]

3 15 **9057.** **Σ 2462.** The two faint stars, C and D, were added with the 18½-inch. No material change in B.

AB	1868.19	153°9	8″25	4*n*	Δ	10.0... 9.9
	1905.45	159.4	8.23	2*n*	β	9.5... 9.5
AC	1905.44	230.2	9.43	1*n*	β	...13.0
BD	1905.45	71.7	5.91	2*n*	β	...13.0

[Ma (*F. S.* **II**)...Ma (**XI**)...Δ (**II**)...β¹...β⁶...]

3 24 **9058.** **Ho 570.** Probably DM (18°) 3966.

1902.34	224°1	10″34	3*n*	Doo

[Ho (3557)...]

3 25 **9059.** **Ho 98.** Probably unchanged. These are all the measures:

1886.41	163°6	0″27	3*n*	Ho
1893.61	143.5	0.30	2*n*	Ho
1895.61	132.4	0.3±	4*n*	Ho
1899.58	142.7	0.35	5*n*	Gr. Obsy.
1901.63	142.1	0.26	2*n*	A
1901.84	145.8	0.24	1*n*	Bryant
1902.69	127.5	0.27	1*n*	Lewis
1904.00	144.9	0.24	2*n*	Doo

[Ho (2778, 3234, 3558)...Greenwich Obsy. (*Mon. Not.* **LX**, 511; **LXII**, 383; **LXIII**, 403)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

3 30 **9060.** **Ho 99.** In measuring Σ 2454, OΣ on two occasions measured another pair, 157°9 : 0″55 : 7–8...8–9 (1841.62) 2*n*, which he could not afterwards identify. It may be Ho 99, in which case there would be slow retrograde motion. This, however, is not shown by recent measures.

1905.65	134°9	0″35	6*n*	Doo

[OΣ (**IX**)...Ho (2778)...]

9061. **Σ 2464.** Perhaps a little change in the angle. 3^m 36^s

1866.15	20°1	1″15	4*n*	Δ
1878.66	23.7	1.19	2*n*	β
1898.70	24.1	1.30	1*n*	Brown
1903.57	28.5	1.19	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...Se...Δ (**II**)...WS²...Sk...β¹...Brown (3646)...Bowyer (*Mon. Not.* **LX**, 511)...Do (3931)...]

9063. **Ho 442.** No material change. 3 39

1896.21	90°4	2″06	2*n*	Ho
1904.53	94.1	2.16	3*n*	Doo

[Ho (*A. J.* 215)(3234, 3558)...]

9064. **Σ 2469.** Unchanged. 3 42

1868.10	122°4	1″31	4*n*	Δ
1881.57	118.7	1.25	2*n*	Ho
1897.55	123.0	1.42	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Gl...WS...WS²...Δ (**II**)...Ho (2978)...T (2991)...Glasenapp (**III, V**)...]

9066. **H 1370.** The 40-inch shows a much nearer companion not previously seen. 4 1

AB	1905.76	243°5	5″23	1*n*	β⁶	...14
AC	1905.74	300.7	21.15	2*n*	β⁶	8.6...11.0

9067. **Σ 2467.** The place of this was originally taken from H (IV). A recent examination shows that it is wrongly identified in DM. It is DM (30°) 3431, the place of which is: 4 2

$$\left.\begin{array}{l}\text{R. A.} = 19^h\ 3^m\ 29^s\\ \text{Decl.} = 30^\circ\ 36'\ 14''\end{array}\right\}$$

Both stars in *A. G. Leiden*. There is no material change since Struve.

1867.26	264°6	10″07	3*n*	Δ
1905.71	263.2	10.43	2*n*	β

[H (**IV**)...Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β⁶...Cin⁵...]

9069. **Ho 100.** No motion. 4 9

1902.64	327°5	4″85	4*n*	Doo

[Ho (2779, 3558)...]

9070. **Ho 571.** The only other position is: 4 13

1903.31	214°1	11″81	4*n*	Doo

[Ho (3557)...]

9071. **Ho 443.** Change in angle? 4 16

1896.39	115°8	2″71	3*n*	Ho
1904.53	117.2	2.77	3*n*	Doo

[Ho (3234, 3558)...]

4^m 18^s **9072.** **H 1367.** No measures of C. A wide pair in Cin^5 1^m 11^s *p* and 4′ *s*, 78°.3 : 29″.42 : 7...11 (1878.66) 1*n*.

1878.33	61°.9	13″.98	3*n*	Cin
1904.54	60.6	14.34	2*n*	Duncan

[H^8...Cin^4...Cin^5...]

(See p. 1080)

4 22 **9073.** **Σ 2470.** (= **S** 714.) Fixed.

1865.80	270°.6	13″.25	3*n*	*Δ*
1890.23	270.2	13.36	3*n*	Giacomelli
1899.68	269.5	13.42	3*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Da^2...Da^3...Se^1...Ra (**XXV**)...*Δ* (1209)... *Δ* (**I, II**)...Giacomelli (**III**)... OΣ (**X**)... Glasenapp (**III, IV**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

4 22 **9074.** **Ho 444.** Without change.

1896.24	73°.1	1″.06	4*n*	Ho
1899.58	77.1	1.03	3*n*	Gr. Obsy.
1904.58	74.2	1.12	3*n*	Doo

[Ho (3234, 3558)....Greenwich Obsy. (*Mon. Not.* **LX**, 511; **LXVI**, 29)....Doolittle (*Pub. Flower Obsy.* **II**)...]

4 25 **9075.** **Σ 2472.** (CD = **Σ 2473.**) The distance of AB is increasing. As there is no change in AC, this appears to be due to a small proper motion in B.

A and B (= Σ 2472)

1831.86	336°.5	17″.14	3*n*	Σ
1867.77	337.4	17.94	4*n*	*Δ*
1898.59	337.5	19.02	2*n*	Gla
1905.74	338.0	19.28	2*n*	*β*

C and D (= Σ 2473)

1867.77	292°.4	6″.11	4*n*	*Δ*
1898.59	292.0	6.16	2*n*	Gla
1905.74	293.7	6.20	2*n*	*β*

A and C

1867.77	348°.6	74″.85	4*n*	*Δ*
1905.74	348.5	75.05	2*n*	*β*

There is a small star between the two pairs, first mentioned by a correspondent of the *Astronomical Register*. The only measures are:

AE	1905.74	331°.7	50″.38	1*n*	*β*
CE	1905.74	197.4	30.45	1*n*	*β*

[Ma (*F. S.* **I, II**)... *Ast. Reg.* Sept. 1865; Aug. 1867... Se^1 ... Gl..WS ... Kn... Flm...Bl (**V**)...*Δ* (**II**)...*Δ* (2195)...Glasenapp (**V**)...*β*^{6}...]

4 27 **9076.** **Σ 2468.** Fixed.

1867.36	257°.5	7″.43	4*n*	*Δ*
1901.53	257.0	7.75	2*n*	Kustner

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**VII**)... Wr... Se... *Δ* (**II**)... Glasenapp (**V**)... Kustner (3821)...]

4 33 **9077.** **A 95.** No other measures.

[A (3668)(*Bul. L. O.* No. 11)...]

9078. **Σ 2474.** (= **Sh 288.**) Fixed. 4^m 40^s

1866.83	260°.0	17″.10	3*n*	*Δ*
1899.67	259.2	16.94	3*n*	Coleman

[Ma (*F. S.* **II**)...Ma (**IX**)...H^1...Da^1...Da^2...Ra (**XXIV, XXVI**)...Giacomelli (**III**)... *Δ* (1194)... *Δ* (**I, II**)...T (2898)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

9079. **Ho 572.** Fixed. 4 45

1902.35	314°.4	18″.63	3*n*	Doo

[Ho (3557)...]

9081. **See 371.** The other measures are: 4 55

1899.54	330°.2	7″.25	3*n*	Cg	8.0...12.8

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9082. **O. Stone 45.** From Cin^5. No bright star in this place in the DM. Since Part I was in type I have succeeded in identifying this pair. It is Σ 2302 (No. 8420). 5 :

9084. **Σ 2475.** No change. 5 6

1867.64	322°.6	6″.49	4*n*	*Δ*
1904.56	321.2	5.95	3*n*	Miller

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin^6...]

9085. **Σ 2471.** Probably unchanged. 5 10

1866.67	123°.9	8″.07	3*n*	*Δ*
1895.64	124.8	8.11	2*n*	Collins

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**V**) ... Se ... OΣ (**IX**)... *Δ* (**II**)... Cin^6... Jones (*A. J.* 312) ...Collins (*A. J.* 378)...]

9087. **A 150.** No later measures. 5 11

[A (3741) (*Bul. L. O.* No. 3)...]

9089. **H 5096.** The only later position is: 5 12

1904.73	73°.1	17″.70	3*n*	Miller	8.8...9.5

9090. ***Δ* 19.** (AC = **Σ 2479.**) The principal star was found to be a close pair by Dembowski in 1863. The measures indicate some angular change. The proper motion is 0″.070 in 308°.1 (*A. G. Harvard*). 5 52

A and B

1863.87	40°.8	Obl.	4*n*	*Δ*
1870.83	36.8	Obl.	3*n*	*Δ*
1874.09	20.2	0″.65 ±	3*n*	*Δ*
1879.47	26.1	0.57	1*n*	*β*
1883.78	14.5	0.46	1*n*	En
1892.41	20.2	0.71	3*n*	*β*
1894.71	16.2	....	1*n*	Big
1897.71	16.8	0.83	3*n*	A
1903.54	14.6	0.73	2*n*	Do

Very little if any change in the Struve star.

AB and C

1866.78	35°5	6″78	3*n*	Δ
1892.41	32.9	7.04	3*n*	β
1897.69	31.6	6.75	1*n*	A
1903.54	33.7	6.80	2*n*	Do

[Ma (*F. S.* I)...Ma (**XI**)...H (**IV**)...Se...Du....Flm... Δ (1475, 2081)...Δ (II, p. 449)... En (2677)...β³...β (3142)(*Pub. L. O.* **II**)... Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...A (*A. J.* 429)...Do (3931)...]

$5^m\,53^s$ **9091.** **A 263.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

5 57 **9093.** **Schj 19.** Noted as double by Schjellerup. No other measures. The components are DM (0°) 4133 and 4131.

[Schj (1485)...β⁶...]

6 0 **9094.** **Σ 2477** *rej.* Measures by Mitchel (Cin²). Change in distance?

1901.46	46°5	27″96	3*n*	β⁵	8.5...10.5

6 1 **9095.** **β 1204.** *Aquilae* 56. (AG = **Σ 2476.**) The principal star of Σ 2476 was found to be a close pair with the 36-inch. That instrument shows four other stars nearer than the Struve companion. There is no change in this star since the first measures by Struve. The principal star is Lalande 36008. All the measures of the close pair are given.

A and B

1890.56	3°8	0″44	3*n*	β
1893.24	5.7	0.3±	2*n*	Sp
1898.74	8.6	0.38	2*n*	A
1900.85	11.6	0.35	6*n*	Bryant
1901.59	13.8	0.42	2*n*	Doo
1904.56	3.6	0.37	1*n*	Furner
1905.44	8.1	0.47	3*n*	Doo

These are the only other measures of the faint stars:

AC	1898.76	197°1	13″03	3*n*	A	...14.2
AD	1898.76	160.6	21.24	2*n*	A	...14.8
AE	1898.76	315.6	26.65	2*n*	A	...14.5
AF	1898.76	291.1	27.82	2*n*	A	...14.0

AB and G (= Σ 2476)

1828.65	209°3	26″47	1*n*	H	6.7...11
1830.61	214.7	31.41	2*n*	Σ	6.2...11.0
1843.70	214.3	32.38	1*n*	Ma	
1866.70	214.1	31.88	3*n*	Δ	6.2...11.2
1879.58	213.2	31.42	2*n*	Cin	7.0...10.7
1890.55	213.8	31.36	2*n*	β	7.1...10.2
1898.76	214.0	31.52	3*n*	A	...10.2

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3585)...Sp (**III**)...H (*Mem. R. A. S.* **V**)....Ma (*F. S.* **I**)....Ma (**XI**)....Δ (**II**)....Cin⁵....Greenwich Obsy. (*Mon. Not.* **LX**, 511; **LXII**, 383; **LXIII**, 403; **LXVI**, 29)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

6 15 **9097.** **A 151.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

$6^m\,15^s$ **9098.** **H 265.** "The stars C and D distant." Bigourdan gives 114°0 : 10.2...10.6 (1880.54) 1*n*.

6 20 **9099.** **A 152.** "A 10 m star 174°: 20″6."

AB	1901.58	257°0	2″71	3*n*	Es
AC	1901.58	175.0	20.67	3*n*	Es

[A (3741)(*Bul. L. O.* No. 3)...Espin (*Mon. Not.* **LXII**, 532)...]

6 23 **9101.** **H 1373.** The Decl. in Cin is −18° 12′.

1879.59	239°7	9″38	2*n*	Cin	9.0...10.0

[Cin⁵...Cin⁶...]

6 34 **9105.** **H 1374.** In Lalande 7½ m. Nothing later but the following:

AB	1901.29	114°7	14″34	2*n*	β⁵	8.0...11.7
AC	1901.26	5.9	31.34	1*n*	β⁵	...13.5

6 37 **9106.** **β 138.** Discovered with the 6-inch. The measures are not very accordant, and further observations are needed to show whether or not there is any motion.

1892.58	280°5	0″79	1*n*	Ho
1893.75	289.8	1.14	3*n*	W
1898.57	288.6	1.27	3*n*	A
1898.71	277.2	1.05	2*n*	Doo

[β (**III**)....β(*Mon. Not.* **XXXIV**, 59)....Δ (I)....Cin⁴....Cin⁶....Ho (3234).... Wilson (   )...A (3585)...Doolittle (*Pub. Flower Obsy.* **I**)...]

6 40 **9107.** **Schj 20.** Noted as double by Schjellerup. The components are SD (3°) 4513 and 4511. No other measures.

[Schj (1485)...β⁶...]

6 51 **9111.** **Hd 152.** Identified by See as given in Part I. The only measures are:

1896.78	264°8	0″59	2*n*	See	8.0...8.6
1900.82	260.8	1.07	1*n*	Innes	

[See (3496)...Innes (*Mon. Not.* **LXI**, 606)(*Annals Cape Obsy.* **II**)...]

6 51 **9112.** **Σ 2480.** No change.

1866.99	24°5	14″81	3*n*	Δ
1905.39	24.0	14.74	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin⁵...β⁶...]

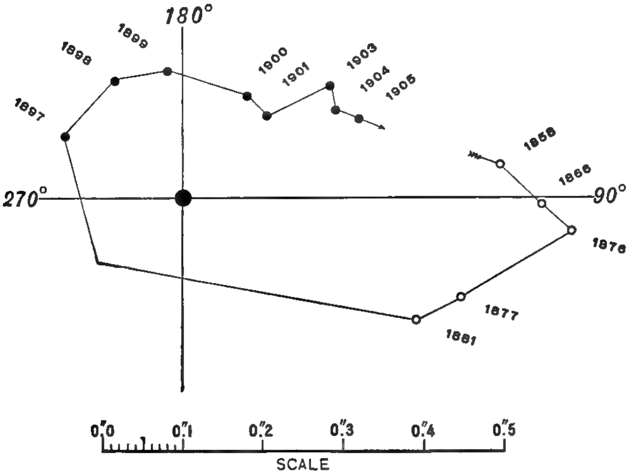
7 5 **9114.** **Se 2.** (AB = **H II. 68 = Σ 2481.**) The close pair was discovered by Secchi in 1856, and is a binary in rapid motion. Although nearly one revolution seems to have been made, the form of the orbit is wholly uncertain, and must

remain so until the maximum distance has been reached with a position-angle of something less than 90°. The early distances are estimated, and some of the angles obviously have large errors. There is nothing in the data at hand to warrant the fixing of the apparent ellipse on the following side.

The following are all the measures:

1858.22	95°5	0″4±	2n	Se
1866.74	88.7	0.45±	1n	OΣ
1876.13	84.8	0.49±	4n	Sp
1877.31	69.8	0.37	2n	Δ
1880.46	91.1	0.37±	5n	Sp
1881.57	61.9	0.33±	3n	Ho
1897.85	243.3	0.17	1n	A
1898.60	211.1	0.17	2n	A
1899.69	187.9	0.16	3n	A
1900.61	148.2	0.15	1n	A
1901.56	134.2	0.15	3n	A
1903.71	127.2	0.23	3n	A
1904.44	120.0	0.22	2n	A
1905.29	114.3	0.24	1n	A

The proper motion of the triple system from meridian positions is 0″273 in 251°6 (Porter). The movement of BC with respect to A is rectilinear, from which it may be inferred that the double component has a proper motion differing slightly in direction and amount from that of A.

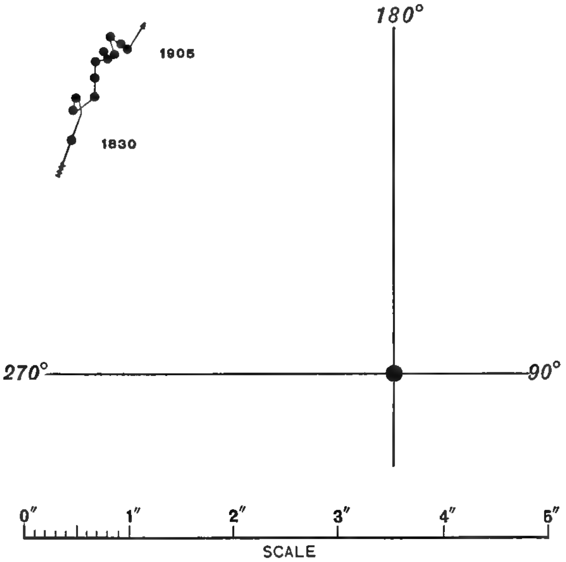


Σ 2481. B and C.

1783.33	261°6	....	1n	H
1830.45	234.3	3″83	3n	Σ
1855.56	229.4	4.03	4n	OΣ
1857.80	230.8	3.99	3n	Se
1867.65	227.6	3.92	4n	Δ
1875.68	225.5	4.06	2n	Du
1882.68	223.9	4.16	4n	Hl
1885.10	222.6	4.09	8n	Per
1887.73	222.2	4.18	2n	HΣ
1895.79	221.4	4.10	2n	Collins
1897.85	220.4	4.24	1n	A
1903.56	220.0	4.12	3n	Do
1905.74	219.4	4.02	3n	β

Herschel's angle in 1783 is evidently too large. There is a pair of small stars in the field about 3′ *s*, first mentioned by Wr.

1888.76	197°5	8″51	1n	T	
1905.75	200.8	7.22	1n	β	10.5...10.7



Σ 2481. A and BC.

[Ma (*F. S.* **I**) ... Ma (**XI, XV**) ... Wr ... Se ... Ra (**XXV, XXIX**) ... Du ... Flm ... OΣ (**IX**) ... Δ (1194) ... Δ (**I, II**) ... Do (3023, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (2133) ... Sp (**II**) ... Per ... Per (2559) ... Ho (2978) ... T (2991) ... See (*Beob. Berlin*, No. 6, 1892) ... Jones (*Proc. Haverford Coll. Obsy.* 1892) ... Hl (*Wash. Obsns.* 1885) ... Hl (**I, II**) ... Glasenapp (**III**) ... Collins (*A. J.* 378) .... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**) .... Espin (*Mon. Not.* **LXIV**, 677) ... A (3585, 3639) (*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XVII**, 113) ... Biesbroeck ... β6 ...]

(See p. 1080)

9115. **Cordoba.** Both components given in Cord. G. C $7^{m}\ 11^{s}$

1900.70	329°1	2″21	1n	Lunt

[See (3496) ... Lunt (*Mon. Not.* **LXI**, 606) ... Scott (*Mon. Not.* **LXIV**, 52) ...]

9116. **β 139.** *Aquilae* 59. (AC = OΣ (App) 177.) The principal star of this very wide pair of bright stars was found to be a close double with the 6-inch. The measures, so far, show no change. There are several other faint stars nearer than C; one a 13m star from AB, 103°6 : 27″75 (1899.44). The change in C is due to proper motion. Auwers gives the proper motions of the two bright stars: 7 12

AB 0″030 in 270°0 = Lalande 36081
C 0.223 in 148.5 = Lalande 36074

A and B

1875.58	137°4	0″59	5n	Sp
1883.66	140.9	0.56	2n	Ho
1888.10	140.3	0.56	7n	Sp
1888.76	140.0	0.58	4n	T
1898.57	140.9	0.84	4n	A
1900.49	139.0	0.74	3n	Doo

AB and C (= OΣ (App) 177)

1874.96	288°3	120″76	3*n*	Δ
1891.08	287.1	118.07	4*n*	Franz
1898.56	286.5	116.54	2*n*	A
1905.45	285.8	115.65	2*n*	β

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59) ... Newcomb (*Wash. Obsns.* 1874)... Sp (**II** App.)...Sp (2133)... Δ (**I**) ... Δ (2086)... Ho (2978)...Sp (**III**)...T (2991)... Franz (3464) ... Rechenberg (3482)... Maw (**III**) ... A (3585) ... Do (3680) ... Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

7^m 27^s **9117.** **Ho** 445. The only later position is:

1904.53	243°4	5″16	4*n*	Doo

[Ho (3234)...]

7 39 **9118.** 21 *Aquilae.* **H** 879. "The field full of stars." The following are all the measures:

1878.45	286°4	36″19	1*n*	β^1	
1904.34	287.6	36.23	3*n*	β^6	...12.3

7 43 **9119.** **β** 422. Discovered with the 6-inch. Unchanged.

1898.54	42°0	12″61	3*n*	Doo	7.6...9.9
1905.55	44.4	12.70	3*n*	Doo	

[β (**VII**) .... β (2103, 3114)(*Pub. L. O.* **II**) .... Cin^5.... Doolittle (*Pub. Flower Obsy.* **I**)...]

7 43 **9120.** **A** 264. (AC = **Ma** 7 = **Ho** 446.) The small star C was detected by Ma in 1843, and independently by Ho in 1893; the nearest companion by A, and about the same time by β; and the faint double DE by A with the 36-inch.

A and B

1901.47	290°7	2″72	3*n*	β	...12.8

A and C

1893.67	45°4	5″69	3*n*	Ho	...12.0
1901.35	48.3	5.32	3*n*	A	...12.0
1901.46	48.6	5.10	4*n*	β	...11.7
1904.53	48.2	5.63	3*n*	Doo	

[Ma (**XI**)...Ho (3234)...A (3784)(*Bul. L. O.* No. 16)...β^6...]

7 44 **9123.** **Σ** 2483. Unchanged.

A and B

1870.06	318°4	9″77	4*n*	Δ
1892.07	317.8	10.00	4*n*	Gla

A and C

1867.49	236°8	71″41	3*n*	Δ
1892.07	236.5	70.93	4*n*	Gla

[Ma (*F. S.* **I**)...H (**IV**)... Δ (**II**)... Je (2407)... Cin^5...Glasenapp (**III, IV**)...]

7 46 **9124.** **Σ** 2482. No material change.

1867.60	345°9	2″03	4*n*	Δ
1887.79	344.3	1.98	3*n*	HΣ

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Se.... Δ (**II**)....Per....Per (2748)....Collins (*A. J.* 378)...HΣ (**XII**)...]

8 0 **9126.** **A** 153. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

9127. **Ho** 573. The later measures show no sensible change. 8^m 2^s

1902.37	127°0	7″24	4*n*	Doo

[Ho (3557)...]

9128. **H. A. Howe** 46. Discovered by Howe at Cincinnati. Unchanged. 8 9

1904.55	161°3	5″32	3*n*	Doo

[Cin^5...Lv^1...Wilson (Cin^{10})...Collins (*Proc. Haverford Coll. Obsy.* 1891)... Scott (*Mon. Not.* **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9129. **A** 154. No other measures. 8 18

[A (3741)(*Bul. L. O.* No. 3)...]

9131. **Ho** 101. Probably unchanged. 8 38

1902.65	110°8	2″04	4*n*	Doo
1904.51	105.8	1.95	1*n*	Lewis

[Ho (2778, 3234)...Lewis (*Mon. Not.* **LXVI**, 29)...]

9132–33. **H** 2858 **and H** 2859. "A curious pair of double stars." The following are the only observations: 8 46

H 2858

1901.82	257°6	19″02	2*n*	β^5	9.2...12.2

H 2859

1901.82	28°5	11″20	2*n*	β^5	9.2...13.0

H 2858 and H 2859

1901.43	10°2	132″70	1*n*	β^5

9134. **OΣ** 369. Motion uncertain. 8 49

1869.11	41°2	0″80	6*n*	Δ
1898.64	35.8	0.73	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)... Δ (**I**)...Glasenapp (**III**)...Brown (3646)...Hu (*Pub. L. O.* **V**)...]

9135. **H** 1377. "Very difficult to measure." The large star has a proper motion of 0″015 in 233°7 (Battermann.) 8 51

1901.52	356°8	36″34	2*n*	β^5	7.0...12.9

9136. **Σ** 2484. No material change. 8 59

1843.72	224°3	2″43	2*n*	Ma
1857.26	224.0	2.49	3*n*	Se
1867.64	227.1	2.56	4*n*	Δ
1871.34	224.9	2.62	3*n*	OΣ
1884.08	226.7	2.66	6*n*	En
1886.60	226.3	2.50	4*n*	Per
1895.81	226.9	2.21	2*n*	Collins
1902.75	229.0	2.44	2*n*	Do

[Ma (*F. S.* **I**) ...Ma (**XI, XIII, XV**)...Se...OΣ (**IX**)... Δ (2195)... Δ (**II**)...Flm ... Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13) ...Gl ... WS...WS^2 ...Sk^2...UL...Sp (**II**)...Per...Per (2748)...En (2677)...Glasenapp (**III**)... HΣ (**XII**)....Collins (*A. J.* 378) .... Hu (*A. J.* 397)....Maw (**III**)....*Annals Toulouse Obsy.* **III**...Sk^5...]

$9^{m}\ 0^{s}$ **9137.** **Σ 2486.** (= **Sh 290.**) *Cygni* **6.** Very little relative change, but the components have a large common proper motion. This is given from meridian positions:

A = 0″658 in 341°9 Porter
0.602 in 342.0 Paris
B = 0.646 in 343.9 Porter
0.614 in 347.7 Paris

The components have been observed for parallax, Hl (*Wash. Obsns.* 1883) and Bl (*Dunsink Obsns.* V).

1867.64	221°9	9″97	5*n*	Δ
1885.94	220.1	9.75	6*n*	Hl
1898.97	218.2	9.63	2*n*	Coleman
1905.76	217.0	9.21	2*n*	β

[Ma (*F. S.* **I, II**) ... Ma (**XI, XIII, XV**) ... Wr... Se ... Da2 ... Ra (**XXIII**) ... OΣ (**IX**) ... Flm ... Δ (*Mem. Accad. Sci.*) ... Δ (1032) ... Δ (**I, II**) ... WS ... WS2 ... Gl ... Sk2 ... Ferr ... Du ... Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Bl (**V**) ... Hl (*Wash. Obsns.* 1883, 1885–86) ... Hl (**I, II**) ... Goldney (2259) ... Je (2407) ... Per ... Per (2559) ... Engelhardt (**III**) ... Glasenapp (**III**) ... Big ... Big (*Bul. Ast.* **XII**, 299) ... Chofardet (3450) ... Knorre (3518) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) ... Thiele (3837) ... Sk5 ... Coleman (*Mem. R. A. S.* **LIV**) ... β6 ...]

9 2 **9138.** **H 5101.** The later measures are:

1878.58	305°7	21″82	2*n*	Cin	
1901.65	306.6	21.14	2*n*	β	8.5...9.0

Another pair in this vicinity noted by Howe, 21°4 : 2″5± : 8.5...10.0 (1877.73).

[Cin4 ... Cin5 ... β5 ...]

9 4 **9139.** **H 1376.** The only measures are:

1901.44	122°6	10″15	2*n*	β5	8.0...11.2

9 9 **9140.** **Σ 2485** *rej.* These are all the observations since Struve:

1904.56	317°6	8″26	2*n*	Duncan	
1905.76	320.0	8.71	2*n*	β6	8.3...11.0

9 24 **9141.** **Sh 289.** (= **H V. 42.**) Probably fixed.

1782.46	63°7	38″13	1*n*	H	
1879.31	57.3	39.59	1*n*	β	8.0...8.3
1900.53	57.1	39.35	1*n*	Espin	
1905.75	56.8	39.45	1*n*	β	

[Cin5 ... β3 ... Espin (*Mon. Not.* **LXII**, 533) ... β6 ...]

9 30 **9142.** **H 1380.** Apparently unchanged.

1875.67	226°4	5″01	4*n*	Δ	8.5...9.2
1901.65	228.9	5.24	2*n*	Es	

[Δ (**I**) ... Big ... Espin (*Mon. Not.* **LXIV**, 680) ...]

9 32 **9143.** **A 265.** No later measures.

[A (3784) (*Bul. L. O.* No. 16) ...]

9144. *η Lyrae.* **Σ 2487.** (= **H IV. 2 = Sh 291.**) Fixed. $9^{m}\ 40^{s}$

1866.98	83°9	28″22	4*n*	Δ
1904.31	82.4	27.99	2*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**IV, V**) ... Pk ... Δ (1194) ... Δ (**I, II**) ... Bl (**V**) ... Je (2407, 2449) ... Glasenapp (**III**) ... *Annals Toulouse Obsy.* **III** ... Espin (*Mon. Not.* **LXIV**, 677) ... β6 ...]

9146. **OΣ 366** *rej.* Rejected in second edition of *Poulkowa Catalogue.* No change. 9 48

1898.63	230°4	21″82	4*n*	Hu
1901.53	229.9	21.94	2*n*	β

[Ma (**XI**) ... Δ (**I**) ... Hu (*Pub. L. O.* **V**) ... Espin (*Mon. Not.* **LXIV**, 678) ... β5 ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

9148. **A 266.** No other measures. 9 51

[A (3784) (*Bul. L. O.* No. 16) ...]

9149. **OΣ (App) 178.** B is Lalande 36203. Secchi's distance of 80″84 is probably a misprint, and the angle requires a correction of 180°. No change since the measures of Dembowski. 9 52

1900.68	267°6	89″87	2*n*	β

[Se1 ... Δ (**I**) ... β5 ...]

9150. **Hn 34.** The later measures are: 9 55

1887.80	269°2	3″01	3*n*	Com
1905.68	269.4	2.94	1*n*	β

The proper motion is given, 0″043 in 0° (*A. G. Harvard*).

[β4 ... Com (**VI**) ... β6 ...]

(See p. 1080)

9152. **β 975.** (AB = **OΣ 367** *rej.*) The close pair was discovered with the 18½-inch. There seems to be no material change in this or in OΣ 367 *rej.* This was excluded from the last edition of the *Poulkowa Catalogue* by reason of the distance between the components. 10 4

B and C

1881.63	220°3	0″82	3*n*	Ho
1890.63	222.3	0.83	3*n*	β
1898.62	227.3	0.95	3*n*	Hu
1902.78	223.9	0.89	4*n*	Doo

A and BC (= OΣ 367 *rej.*)

1843.66	229°5	33″73	1*n*	Ma
1880.59	228.0	33.42	2*n*	β
1881.62	226.6	33.54	1*n*	Ho
1890.63	227.3	33.34	1*n*	β
1898.61	228.1	33.41	4*n*	Hu
1902.46	227.8	33.61	3*n*	Doo

A and *a*

1881.26	68°4	22″95	1*n*	Ho
1903.75	68.9	22.43	2*n*	Doo

[β (**XIII**) ... β3 ... β (2341, 3048) (*Pub. L. O.* **II**) ... Ho (2978) ... Ma (**XI**) ... Δ (**I**) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

10^m 7^s **9153.** Arg. 34. "Duplex" in O. Arg. N. Examined in 1904 and found not double. There are several small stars in the field. The wide pair, A. G. 228, is about 2^m *f*.

10 12 **9154.** β 140. Discovered with the 6-inch. There appears to be no change in either companion.

B and C

1896.66	208°6	7″66	3*n*	Lv
1898.59	209.6	7.13	2*n*	β
1898.66	209.8	7.35	3*n*	Doo

A and B

1896.66	324°9	37″30	3*n*	Lv
1898.59	325.5	37.26	2*n*	β
1898.66	325.9	37.46	3*n*	Doo

[β (**III**) ... β (*Mon. Not.* **XXXIV**, 59) ... β (3114) ... (*Pub. L. O.* **II**) ... Cin^5 ... Lv (*A. J.* 407) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

10 15 **9155.** Σ 2488. Slow motion in angle.

1857.12	323°0	1″38	2*n*	Se
1867.39	325.0	1.46	4*n*	Δ
1888.61	329.6	1.43	2*n*	Hl
1895.74	331.4	1.72	2*n*	Collins
1902.26	326.7	1.58	5*n*	Bowyer
1902.80	332.1	1.46	2*n*	Do

[Ma (*F. S.* **I**).. Ma (**X, XI, XIII**) ... H (**V**) ... Da^3 ... Se ... Se^2 ... Flm ... WS^2 ... Sk ... Δ (2195) ... Δ (**II**) ... Do (2303, 3931) ... Hl (**II**) ... Sk^4 ... Collins (*A. J.* 378) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29) ... HΣ (**XII**) ...]

[Proper motion 0″121 in 234°7 (Auwers)]

10 37 **9157.** OΣ 368. Apparently fixed. The faint star not in OΣ. The measure of AB by Newcomb probably belongs to some other pair.

A and B

1868.83	214°0	0″96	6*n*	Δ
1878.68	216.2	1.03	3*n*	β
1882.64	212.7	0.86	5*n*	Hl
1898.44	215.9	0.83	3*n*	Hu
1904.59	216.5	0.85	2*n*	Bowyer

AB and C

1899.61	101°7	17″72	1*n*	Bowyer

[Ma (**XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Flm ... Se ... Newcomb (*Wash. Obsns.* 1874) ... Hl (*Wash. Obsns.* 1884) ... Hl (**I, II**) ... Sp (**III**) ... Per ... Per (2685, 2749) ... En (2786) ... β^1 ... Lv^1 ... Callandreau (*Bul. Ast.* **XII**, 523) ... Glasenapp (**III**) ... Big (*Bul. Ast.* **XII**, 299) ... Do (2307, 3466, 3680) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 510; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29) ... Maw (**III**) ... Hu (*Pub. L. O.* **V**) ...]

10 47 **9161.** S 715. (= **H** 596). Probably fixed.

1879.60	13°6	8″52	4*n*	Cin	7.0 ... 8.1
1888.53	14.1	8.14	1*n*	Lv	6.5 ... 7.5
1903.63	15.0	8.34	5*n*	Jouffray	

[H^1 ... H (**IV, VII**) ... WS^2 ... Cin^4 ... Cin^5 ... Wilson (Cin^{10}) ... Lv^1 ... Glasenapp (**I**) .... Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52) .... Do (3799) .... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

9164. Σ 2489. *Aquilae* 71. Probably fixed. 10^m 57^s

1866.33	346°9	8″14	4*n*	Δ
1897.61	346.8	8.16	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XIII, XV**) ... Do (2242)(*Trans. R. I. Acad.* **XXIX**, Part 13) ... Δ (**II**) ... Glasenapp (**V**) ... *A. G. Leipzig*, p. 210 ... *Annals Toulouse Obsy.* **III** ...]

9166. 1 *Vulpeculae.* **H** 2862. "Very delicate." The proper motion of the principal star is 0″012 in 265°5 (*A. G. Berlin*). There is a 13 m star, 158°2 : 43″5 (1901). 11 3

1901.50	12°9	39″07	3*n*	β^5

9167. OΣ 371. No change in either component. 11 7

A and B

1868.68	153°9	0″94	4*n*	Δ
1886.60	154.0	0.79	3*n*	Hl
1898.66	154.7	0.85	3*n*	Hu
1904.44	155.9	0.92	3*n*	Doo

AB and C

1887.76	269°6	47″50	3*n*	T
1898.66	268.0	47.80	3*n*	Hu

[Ma (**XI, XIII**) ... Se ... Da^3 ... OΣ (**IX**)(**X**, pp. 41, 196) ... Δ (**I**) ... Du ... Flm ... Ferr .... Newcomb (*Wash. Obsns.* 1874) .... Callandreau (*Bul. Ast.* **XII**, 523) ... Hl (*Wash. Obsns.* 1886) ... Hl (**II**) .... Per .... Per (2685) .... En (2678) ... Engelhardt (2785) (**II**) ... T (2899) ... Glasenapp (**III**) ... Big (*Bul. Ast.* **XII**, 299) ... Knorre (3300) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 511; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29) ... Maw (**III**) ... Do (3680) ... Hu (*Pub. L. O.* **V**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

9168. **H** V. 77. *Sagittarii* 214. P XIX, 43. The measures since Herschel show no motion. 11 10

1879.41	159°0	39″87	2*n*	β^3	7.6 ... 9.5
1900.47	159.4	39.60	1*n*	β^6	7.0 ... 8.5

9170. S 716. (= **H** 1381.) Probably unchanged. 11 12

1878.59	195°5	4″96	6*n*	Cin	
1890.50	196.0	4.93	2*n*	Gla	8.1 ... 8.3
1903.59	195.8	4.96	7*n*	Jouffray	

[H^1 ... WS^2 ... Cin^4 ... Cin^5 ... Lv^1 ... Wilson (Cin^{10}) ... Glasenapp (**I**) ... Do (3799) ... Scott (*Mon. Not.* **LXIV**, 56) ... Jouffray (*Bul. Ast.* **XXI**, 299) ...]

9171. OΣ 370. Fixed. 11 19

1867.77	15°1	19″52	4*n*	Δ
1898.51	14.4	19.56	3*n*	Hu

[Ma (**XI, XIII**) ... OΣ (**IX**) ... Δ (**I**) ... Per ... Per (2749) ... Glasenapp (**III**) ... Solá (3529, 3679) ... Hu (*Pub. L. O.* **V**) ...]

9172. Ho 447. Not in DM. The only later measure is: 11 22

1904.04	177°6	1″23	4*n*	Doo

[Ho (3234) ...]

$11^m 24^s$ **9173.** **Σ 2491.** The angle is slowly increasing, with no sensible change in distance.

1841.41	211°6	1″23	3*n*	Da
1868.60	213.0	1.10	4*n*	Δ
1883.60	214.7	1.28	4*n*	Per
1887.02	215.5	1.32	3*n*	HΣ
1904.58	221.5	1.04	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**X, XIII**)...Da³...Bp...Se...OΣ (**IX**)...Flm...Δ (**II**)...Δ (2199)...Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...WS²...Sk...Sk⁵...Per...Per (2749)...Big (*Bul. Ast.* **XII**, 299)...Glasenapp (**V**)...HΣ (**XII**)...Bryant (*Mon. Not.* **LX**, 511)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11 38 **9175–76.** **A 155 and A 156.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

11 42 **9177.** **Σ 2490.** Probably unchanged.

1866.91	246°2	3″25	3*n*	Δ
1886.56	247.3	3.52	2*n*	LM
1899.79	243.3	3.03	1*n*	Bryant

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Δ (**II**)...LM...Bryant (*Mon. Not.* **LX**, 511)...]

11 43 **9178.** **H 881.** (= **Ho** 574.) "Curious case of contrasted colors; *red:* small stars *blue.*"

A and *a*

1895.09	61°8	15″45	3*n*	Ho	7.3...12.2
1903.54	62.4	15.67	2*n*	β	7.2...13.5
1904.43	61.2	15.74	3*n*	Doo	

A and B

1895.81	343°3	32″21	1*n*	Ho	... 9.5
1903.54	341.7	32.77	2*n*	β	...10.1
1904.45	340.6	33.20	4*n*	Doo	

B and C

1905.18	305°8	7″00	2*n*	Ho	... 9.5
1903.54	308.0	7.31	2*n*	β	...10.3
1904.45	306.9	6.93	4*n*	Doo	

[Ho (3557)...β⁶...]

11 46 **9179.** **H 5508.** In Lalande 7½ m.

1879.39	95°2	.....	1*n*	Cin⁵	7.5...13
1903.54	96.1	19″48	2*n*	β⁶	7.4...11.9

11 59 **9181.** **H 5509.** "Very beautiful double star." The only measure is:

1903.56	104°0	7″06	3*n*	β⁶	9.0...9.2

12 2 **9182.** **A 157.** Discovered independently by Espin.

[A (3741)(*Bul. L. O.* No. 3)...Espin (*Mon. Not.* **LXII**, 533)...]

12 4 **9183.** **A. G. 228.** The companion is DM (62°) 1696. Measures by β⁶.

9184. **H 2863.** B. A. C. 6590. "A third *np* very strongly suspected." Nothing else seen with 6-inch on 2*n* (1874). The principal star has a considerable proper motion, 0″317 in the direction of 197°0 (Paris). The 40-inch shows no third star. $12^m 10^s$

1900.50	16°3	45″81	2*n*	β⁵	6.2...11.7

9185. **Σ 2496.** *Cygni* 9. B. A. C. 6603. Fixed. 12 10

1868.12	76°3	2″27	4*n*	Δ
1879.49	79.2	2.31	1*n*	β
1902.62	78.3	2.46	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Bl (**V**)...Δ (**II**)...Hl (**I**)...β³...]
(See p. 1081)

9186. *θ Lyrae.* **Sh 292.** (= ♅ **VI.** 56 = σ 614.) No measures by ♅. B is DM (37°) 3399. The large star has a proper motion of 0″012 in 299°4 (Auwers). The following are all the observations since Sh. 12 12

1879.52	70°3	100″73	1*n*	Cin⁵	5.0...8.0
1903.57	71.0	99.67	3*n*	β⁶	...8.8
1904.81	71.0	100.14	2*n*	Es	

9187. **Ho 102.** No motion. 12 13

1893.66	58°1	1″61	1*n*	Ho	10.0...10.5
1902.16	55.9	1.96	5*n*	Doo	

[Ho (2779, 3558)...]

9188. **Ho 575.** No motion. 12 23

1904.41	11°2	5″76	3*n*	Doo

[Ho (3557)...]

9189. 23 *Aquilae.* **Σ 2492.** (= ♅ **I.** 14.) Fixed. The proper motion is 0″033 in 312°5 (Auwers). 12 26

1865.04	10°8	3″03	3*n*	Δ
1880.69	11.6	3.33	1*n*	β
1893.69	10.3	3.13	2*n*	Gla
1905.79	9.5	3.05	4*n*	β

The 40-inch shows a new star:

1905.81	60°6	12″48	2*n*	β	...13.7

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Mh...H (**VII**)...Se...Hd...WS...WS²...Gl...Δ (**II**)...Sp (**II**)...β³...Glasenapp (**III**)...Solá (3529, 3679)...β⁶...]

9190. **A 158.** Discovered independently by Espin. 12 28

[A (3741)(*Bul. L. O.* No. 3)...Espin (*Mon. Not.* **LXII**, 533)...]

9191. **Ho 103.** Probably unchanged. 12 33

1891.69	247°4	3″25	1*n*	Collins
1904.55	249.2	3.33	3*n*	Doo

[Ho (2779, 3558)...Collins (*Proc. Haverford Coll. Obsy.* 1891)...]

$13^{m}\ 36^{s}$ **9192.** **β 1256.** Discovered with the 36-inch. The planetary nebula, Dreyer 6781, is 12′ *n*.

1893.77	38°.2	0″.5±	1*n*	Sp
1898.59	36.8	0.71	3*n*	A
1901.57	33.4	0.72	3*n*	Doo
1902.17	38.0	0.70	6*n*	Bryant

[β (**XVIII**)....β (3113)...Sp (**III**)...A (3585)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Doolittle (*Pub. Flower Obsy.* **II**)...]

13 38 **9193.** **A 267.** A faint star, 91°:9″.

[A (3784) (*Bul. L. O.* No. 16)...]

13 39 **9194.** 2 *Vulpeculae.* **β 248.** Discovered with the 6-inch. A fine pair with a moderate aperture, but so far the measures do not show any relative change. The principal star has no sensible proper motion. Some of the later measures are:

1879.43	127°.8	1″.89	1*n*	β
1879.58	124.2	1.79	4*n*	OΣ
1881.64	124.7	1.78	2*n*	Ho
1884.11	130.5	2.08	6*n*	En
1885.26	128.1	1.94	5*n*	HΣ
1887.76	134.2	2.12	6*n*	T
1888.72	128.2	2.00	5*n*	T
1889.51	125.9	1.70	6*n*	Sp
1890.63	125.4	1.86	3*n*	β
1896.85	129.6	1.84	2*n*	Maw
1898.73	127.7	1.97	3*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β3...β (3048)(*Pub. L. O.* **II**)...Δ (**I**)...Δ (2086)...OΣ (**X**)...Ho (2978)...Perry (*Eng. Mech.* **XXXVI**, 65; **XXXIX**, 11)....HΣ (**XII**)....En (2678)....T (2899, 2991)....Sp (**III**)....Collins (*Proc. Haverford Coll. Obsy.* 1891)...Doolittle (*Pub. Flower Obsy.* **I**)...Maw (**I, III**)...Lohse (*Pub. Potsdam Obsy.*)...]

13 40 **9195.** 24 *Aquilae.* **Σ 40, App. I.** B is P XIX. 55. Without change. The proper motion of 24 *Aquilae* is given, 0″.061 in 287°.1 (Auwers), and the other star seems to have the same movement.

1870.33	316°.1	423″.43	7*n*	Δ
1894.60	316.0	423.43	2*n*	Gla

[Ra (**XXV**)...Δ (**II**)...Je (2340)...Maiebckato (*Obsns.* 1892)...Glasenapp (**III**)...]

13 8 **9197.** **H 266.** "A suspected stellar nebula in the field; distant about 10′ *sp.*" I found this very faint with the 6-inch; might be a nebula, or close pair of small stars (1873). The 40-inch (1901) shows this as a double nebula, with the appearance of belonging to the planetary class. It was rediscovered by Marth, and is Dreyer 6778. H 266 is not in DM, but closely following DM (−1°) 3706.

1901.56	265°.6	14″.56	2*n*	$β^5$	10.2...10.6

13 25 **9201.** **Σ 2499.** Fixed.

1869.08	324°.0	2″.43	4*n*	Δ
1905.76	325.9	2.42	1*n*	β

[H1...H (**V**)...Ma (**XI**)....Ma (*F. S.* **I**)...Se...Δ (**II**)...Cin5...Glasenapp (**III**)...β6...]

9204. **Σ 2494** *rej.* "*Yellow: blue,*" H. Measures by Mitchel; magnitudes from *Catalogus Novus.* The only position later is the following: $13^{m}\ 36^{s}$

1901.08	81°.1	25″.29	2*n*	β	7.4...9.5

[H (**VII**)...Mh...β5...]

9207. 28 *Aquilae.* **S 717.** (= **H V. 34 = OΣ (App) 179 = σ 618.**) Relatively fixed. A more distant faint star *f.* The smaller star seems to have the same proper motion as the other, 0″.029 in 310°.8 (Auwers). 14 3

1856.48	175°.9	60″.04	4*n*	OΣ	5.5...8.2
1874.63	175.2	60.27	3*n*	Δ	5.8...8.2
1904.29	175.5	60.14	3*n*	β	...8.3

[Δ (**I**)...OΣ (**X**)...P. Smythe (*Mon. Not.* **XXIII**, 8)...β6...]

9208. **Σ 2497.** (= **Sh 293.**) Fixed. 14 7

1867.10	357°.0	30″.03	4*n*	Δ
1892.14	357.1	30.12	4*n*	Gla

[Ma (*F. S.* **II**)...Ferguson (*Wash. Obsns.* 1863)...Ra (**XXIV**)...Δ (1125, 1209)...Δ (**I, II**)...Glasenapp (**I, III**)...*Annals Toulouse Obsy.* **III**...]

9210. **Σ 2500** *rej.* Measures from H (V). The principal star has a proper motion of 0″.062 in 280°.3 (*A. G. Berlin*). 14 11

1901.50	23°.7	19″.90	2*n*	$β^5$	8.0...10.5

9211. **Σ 2498.** No change. 14 12

1866.20	66°.0	11″.99	3*n*	Δ
1905.76	66.2	12.23	1*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....Ra (**XXIII**)....H (**V**)....Δ (1209)....Δ (**I, II**)....Glasenapp (**I, III**)....*Annals Toulouse Obsy.* **III**....β6....]

9213. **β 360.** Discovered with the 6-inch. Unchanged. 14 19

A and B

1891.77	71°.8	6″.48	2*n*	β
1899.44	70.7	6.58	1*n*	β
1901.60	72.1	6.71	2*n*	Doo

A and C

1891.77	342°.1	36″.45	2*n*	β
1899.44	343.1	36.94	1*n*	β
1901.60	342.3	36.73	2*n*	Doo

[β (**VI**)....β (2062, 3114)(*Pub. L. O.* **II**)....Δ (**I**)....Doolittle (*Pub. Flower Obsy.* **II**)....]

9214. **Σ 2508.** Fixed. 14 24

1867.67	118°.0	17″.64	3*n*	Δ
1905.76	117.3	17.36	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β1...Glasenapp (**III**)...β6...]

9215. **H 597.** H (V) gives 227°.0:15″:10–11...11. 14 29

$14^m\ 35^s$ **9216.** **H VI. 120.** (= σ **617.**) B. A. C. 6616. Nothing since 1783 but the following:

1904.44	338°3	46″92	1*n*	β^6	...10.8

14 38 **9219.** **Howe 47.** Discovered by Howe at Cincinnati. So far unchanged.

1900.00	151°1	0″40	6*n*	Gr. Obsy.

[Cin^5....Cin^6....Lv^1....β (3048)(*Pub. L. O.* **II**)....Greenwich Obsy. (*Mon. Not.* **LX**, 511; **LXI**, 486)...]

14 46 **9220.** **Ho 272.** Distance larger in the later measures.

1897.18	40°5	7″05	2*n*	Ho
1902.63	40.8	7.31	4*n*	Doo

[Ho (2977, 3558)...]

14 46 **9221.** **Ho 576.** The Decl. in Ho is about 10′ too large. A 10 m star, 254°: 45″.

1904.42	179°6	3″94	3*n*	Doo
1904.61	181.3	3.85	1*n*	Furner

[Ho (3557)...Furner (*Mon. Not.* **LXVI**, 29)...]

14 53 **9222.** **Σ 2502.** No material change.

1868.93	202°6	1″90	4*n*	Δ
1905.72	203.0	1.42	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...Cin^5...β^6...]

15 11 **9223.** **OΣ (App) 180.** No change since 1874.

1900.68	266°4	80″30	2*n*	β

[Δ (**I**)...β^5...]

15 12 **9224.** **Ho 577.** Later measures are:

AB	1904.45	266°5	2″70	3*n*	Doo
AC	1904.45	38.1	13.83	3*n*	Doo

[Ho (3557)...]

15 15 **9225.** **OΣ (App) 181.** One of the stars must have a small proper motion.

1892.70	4°3	55″57	4*n*	Franz
1905.32	3.9	56.28	3*n*	β

[Δ (**I**)...Franz (3464)...β^6...]

15 16 **9226.** **Hn 149.** No material change.

1900.37	181°0	1″09	3*n*	Doo	9.3...9.7

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

15 28 **9229.** **H 884.** Nothing but the following since H:

AB	1901.53	299°4	44″82	2*n*	β^5	7.5...
BC	1901.53	237.9	10.47	2*n*	β^5	10.9...11.0

9230. **Σ 2505.** Fixed. In 1886 Tarrant thought the principal star might be a close pair. It was perfectly round with the 36-inch in 1891. $15^m\ 32^s$

1868.39	315°4	10″12	4*n*	Δ
1905.69	315.4	10.37	2*n*	β

There is a 13 m star, 224°0 : 19″3.

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^5...β (3114) (*Pub. L. O.* **II**)...β^6...]

9231. **A 102.** (AC = **Ho 104.**) The principal star of Ho 104 was found to be a close pair by Aitken in 1900. The later measures are: 15 40

1901.50	36°6	0″38	2*n*	A
1904.66	35.7	0.38	4*n*	Doo

There is no change in the other companion.

1900.80	126°1	5″28	3*n*	A
1904.59	123.7	5.34	3*n*	Doo

[Ho (2779, 3558)... A (3668) (*Bul. L. O.* No. 11)... Doolittle (*Pub. Flower Obsy.* **II**)...]

9232. **Σ 2501.** Unchanged. 15 42

1866.27	22°4	19″91	3*n*	Δ
1901.45	22.0	19.93	2*n*	β

The 40-inch shows a nearer star, 13.5 m, 108°3:9″6 (1901).

[Ma (*F. S.* **I**)... Ma (**XI**)...Mh... Δ (**II**)...Cin^5...Glasenapp (**I**)...β^5...]

9233. **Σ 2504.** Unchanged. 15 42

1867.82	288°0	8″76	4*n*	Δ
1879.69	286.2	8.90	4*n*	Sp
1897.72	287.2	8.62	2*n*	Coleman

[Ma (*F. S.* **I**)... Ma (**X, XI**)... Wr... Se... H (**V**)... Ra (**XXIII**)... Δ (1194)... Δ (**I, II**).... Ferr.... Du....Je (2407).... Sp (**II**).... *Annals Toulouse Obsy.* **III**....Coleman (*Mem. R. A. S.* **LIV**)....Glasenapp (**III**)....Knorre (3518).... Do (3680)....]

9234. **H 1386.** The only observation is an angle by Bigourdan, 146°8 (1880.57) 1*n*. 15 42

9235. **Σ 2509.** Some change in distance is probable; the angle may be diminishing but the motion is very slow. 15 43

1836.93	345°8	0″57	3*n*	Σ
1843.40	339.3	0.55	2*n*	Ma
1857.43	340.3	0.69	3*n*	Se
1865.61	341.8	1.02	8*n*	Δ
1879.70	342.0	0.94	3*n*	Hl
1889.58	338.2	0.93	3*n*	Hl
1895.65	340.4	1.06	2*n*	Gla
1897.89	337.8	0.99	3*n*	Hu
1900.24	336.9	1.33	3*n*	Doo
1903.57	336.5	1.23	3*n*	Do

[Ma (*F. S.* **I**)....Ma (**IX, XI, XIII**)....H (**V**)....Se....Se (*Comp. Rend.* **XLVIII**, 375)...OΣ (**IX**)...Δ (1194, 1209, 1474) ...Δ (**I, II**)...Flm...WS...Gl...Sk... Sk^5...Do (2307, 3931)...Hl (**I, II**)... En (2677)... T (2991)... Maw (**I**)... Big (*Bul. Ast.* **XII**, 299)....Glasenapp (**IV**)....Hu (*A. J.* 427)....Doolittle (*Pub. Flower Obsy.* **I**)...Biesbroeck...]

(See p. 1081)

15m 56s **9239.** **Hn 150.** The following are all the measures.

AB	1899.61	103°.6	1″.25	1*n*	Hu	7.5...12.0
	1903.59	105.0	1.23	2*n*	β	8.1...11.5
AC	1903.58	146.3	7.38	4*n*	β	...13.0

[Hn (*Pub. Washburn Obsy.* **II**)...Hu (*Bul. L. O.* No. 44)...β6...]

15 56 **9240.** **Howe 48.** Probably fixed.

1886.72	81°.5	2″.46	2*n*	LM
1902.52	86.6	2.29	2*n*	β

[Cin4...Cin6....LM...β6...]

15 56: **9241.** **ℌ V. 31.** Exact place uncertain in ℌ. There are many small stars in this vicinity, and difficult to identify from lack of description (1873).

16 2 **9243.** **Σ 2507.** (AB = **H** 1387.) The small star B not in Σ. The principal star has a small proper motion.

A and C

1831.67	136°.7	23″.86	3*n*	Σ
1864.41	138.7	24.92	4*n*	Δ
1880.67	140.5	24.87	2*n*	Sp
1901.74	139.2	25.80	2*n*	Es
1905.64	141.4	25.92	3*n*	β

A and B

1865.09	150°.4	20″.10	4*n*	Δ
1905.29	152.2	21.27	1*n*	β

B and C

1865.08	101°.3	6″.46	2*n*	Δ
1901.74	103.8	7.14	2*n*	Es
1905.81	102.4	6.50	2*n*	β

[Ma (*F. S.* **II**)...H (**IV**)...Δ (1573)...Δ (**II**)...Sp (**II**)...Espin (*Mon. Not.* **LXII**, 530)...β6...]

16 14 **9244.** **Σ 2503.** Fixed.

1868.40	282°.4	2″.47	4*n*	Δ
1905.64	285.9	2.21	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Mh...Hd...Se...Δ (**II**)...β6...]

16 14 **9245.** **Σ 2506** *rej.* Rejected by Struve, as not subsequently found. Found independently by Dembowski, but it had been previously measured by Ma. Evidently without change; error of 180° in Ma.

1843.60	170°.9	16″.33	1*n*	Ma	
1875.01	351.3	16.43	2*n*	Δ	8.5...9.2
1901.65	350.8	16.61	2*n*	β	8.7...9.1

[Ma (**XI**)...Δ (**I**, p. 374)...β5...]

16 27 **9247.** **H 2866.** "A fine triple star." This is H 5112, but the principal star of that is C of H 2866. H (VIII) mentions another star 12 m, 180°: 25″, "est. from diagram" which I could not see with the 6-inch, and there is no allusion to it in H (V). With the 18½-inch it was noted as 200° from C (1878). B and C are respectively O. Arg. S. 19470 and 19471.

A and B

1880.58	53°.0	23″.38	2*n*	Cin	8.0...8.3
1890.52	53.8	23.18	2*n*	Gla	8.1...7.9

A and C

1880.58	137°.1	23″.91	1*n*	Cin	
1890.52	139.4	24.05	2*n*	Gla	...8.6

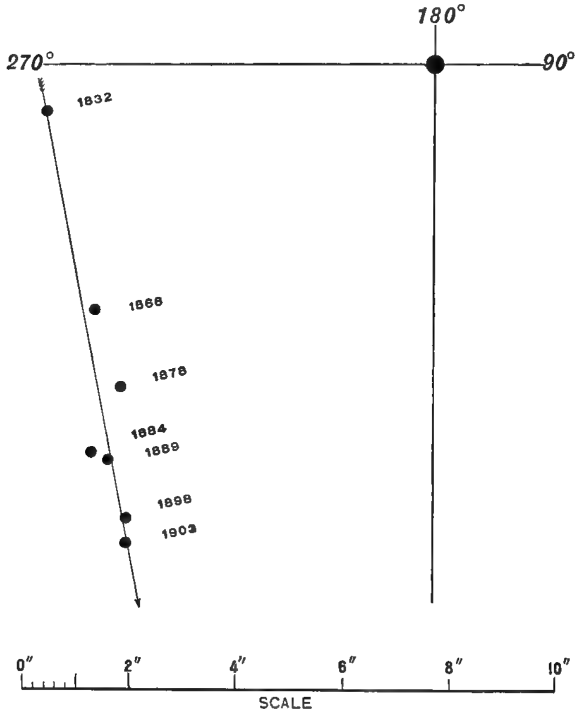
[H (**V, VIII**)...Cin4...Cin6...Glasenapp (**I**)...]

9248. **Σ 3131.** Fixed. 16m 29s

1867.03	305°.6	9″.42	3*n*	Δ
1879.31	305.4	9.57	1*n*	β
1905.69	303.4	9.50	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β3...β6...]

9251. **Σ 2514.** Rectilinear motion. Assuming the smaller component to be fixed, the proper motion of A from the measures is, 0″.121 in 191°.1. This pair is closely *f δ Draconis.* 16 49



Σ 2514.

1832.67	277°.0	7″.39	3*n*	Σ
1866.65	306.3	7.95	4*n*	Δ
1878.41	316.3	8.51	2*n*	β
1884.47	319.2	9.79	5*n*	En
1889.63	321.1	9.70	2*n*	Hl
1898.41	326.4	10.37	4*n*	Doo
1903.18	327.8	10.78	3*n*	β

[Ma (*F. S.* **I**)...Δ (1736)...Δ (**II**)...β1...Flm...En (2677)...Hl (**II**)... Doolittle (*Pub. Flower Obsy.* **I**)...Thiele (3837).. Furner and Storey (*Mon. Not.* **LXIV**, 447)...β6...]

9252. **Ho 105.** No motion. 16 49

1895.19	188°.8	2″.48	4*n*	Ho
1904.59	186.7	2.63	3*n*	Doo

[Ho (2778, 3234, 3558)...]

9253. **β 141.** (AC = **H** 2867.) The principal star of H 2867 was found to be a close pair with the 6-inch; and the 36-inch shows a faint attendant to the other star. No change in the close pair. 16 50

A and B

1875.71	81°4	0″70	4*n*	Sp
1876.56	76.7	0.77	1*n*	OΣ
1885.71	85.6	0.84	6*n*	HΣ
1888.31	80.1	0.66	5*n*	Sp
1890.64	79.2	0.80	3*n*	β
1897.57	81.6	0.84	1*n*	Lewis
1897.95	78.9	0.86	1*n*	Bryant
1898.59	80.0	0.86	3*n*	A
1902.34	84.7	0.71	3*n*	Bowyer

C and D

1897.57	183°0	5″75	1*n*	Lewis
1897.95	181.7	5.39	1*n*	Bryant

AB and C (= H 2867)

1830	329°5	20′±	1*n*	H
1898.59	333.8	28.75	2*n*	A

AB and E

1898.59	90°5	50″28	3*n*	A	...9.7

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59) ... β (3048)(*Pub. L. O.* **II**)... Δ (**I**)... Sp (**II**, App., **III**) ... OΣ (**X**) ... A (3585) ... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 511; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...]

16^m 52^s **9255.** **Hn 35.** (= **Hn 151.**) No change,

1888.68	190°0	1″63	6*n*	Com	9.6...10.1

[β^4 ... Com (**VI**, pp. 109, 110)...]

16 57 **9256.** **A 268.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

17 24 **9259.** **Σ 2511** *rej.* From *Catalogus Novus.*

AB	1904.45	42°4	12″40	2*n*	β^6	7.3...10.9
AC	1904.45	116.0	77.98	2*n*	β^6	... 9.5

17 30 **9260.** **H 5113.** There seems to be an error in Herschel's angle of 121°9. The distance is decreasing, probably from proper motion.

1878.64	170°0	16″66	3*n*	Cin
1889.67	169.3	16.30	2*n*	Hl
1897.14	168.8	15.70	5*n*	See
1905.69	167.5	15.13	2*n*	β

[Hd...Cin^4...Cin^5...Pt...Hl (**II**)...Flm...See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...β^6...]

17 34 **9262.** **Σ 2510.** Since Part I was in type, Aitken has found that the smaller component of Σ 2510 is a very close pair. His measures give:

B and C

1905.66	195°0	0″25	4*n*	A	8.4...9.6

There is no change in the position of this with reference to the principal star:

1866.58	182°0	8″66	3*n*	Δ
1905.63	180.8	8.66	1*n*	A

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H (**IV**) ... Δ (**II**) ... Cin^5 ... Glasenapp (**III**)... Solá (3679)...*Annals Toulouse Obsy.* **III**...]

(See No 13459)

18^m 3^s **9265.** **Glasenapp 8.** The only later measures are:

1902.03	67°4	24″30	2*n*	β	9.0...9.5

[Glasenapp (**I**)...β^5...]

18 5 **9267.** **Σ 2512.** No change.

1868.40	310°5	22″20	4*n*	Δ
1905.51	309.8	22.47	2*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)...β^1...β^6...]

18 11 **9268.** **Hu 74.** "A star 11 m, 208°3 : 21″1 (1903)."

1903.59	90°1	1″37	3*n*	β	8.6...10.7

[Hu (*A. J.* 480)...β^6...]

18 44 **9274.** **Σ 2516.** Fixed.

1868.57	235°7	4″06	4*n*	Δ
1905.64	235.5	3.98	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)... Δ (**II**)...Cin^5...β^6...]

18 49 **9275.** **Ħ VI. 47.** "Identification very precarious." The star given here is very near the place assigned by Ħ; the components are DM (1°) 3986 and 3987.

1904.50	95°0	86″70	2*n*	β^6	8.4...9.0

18 51 **9276.** **β 1129.** Discovered with the 36-inch. The proper motion of this star in *A. G. Harvard* is 0″054 in the direction of 36°2. If either component was fixed, this movement of the other star would change the position-angle in the interval 1889–98 not less than 80°. The magnitude in DM is 7.1.

The following are all the measures:

1889.48	344°3	0″34	3*n*	β
1898.62	340.0	0.44	3*n*	A
1900.55	337.5	0.40	2*n*	Doo
1901.29	337.9	0.29	4*n*	Bryant
1904.00	341.9	0.40	1*n*	Biesbroeck
1905.68	340.6	0.48	1*n*	Doo

[β (**XVI**).... β (2956)(*Pub. L. O.* **II**).... A (3585).... Bryant (*Mon. Not.* **LX**, 511; **LXI**, 486; **LXII**, 383; **LXIII**, 403)... Biesbroeck ... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

(See p. 1081)

18 59 **9277.** **2 and 3** *Sagittae.* **Σ 41, App. I.** The proper motions are given by Auwers:

2 *Sagittae* = 0″029 in 260°1
3 *Sagittae* = 0.020 in 113.2

1870.06	78°9	337″07	7*n*	Δ
1891.59	78.7	337.89	3*n*	Maı
1894.73	78.8	338.01	2*n*	Gla

[Ra (**XXVI, XXVIII**) .... Δ (**II**) .... Je (2341) .... Maiebckato (*Obsns.* 1892) .... Glasenapp (**III**)...]

19 8 **9279.** **Σ 2513.** Change uncertain.

1866.70	316°7	2″21	3*n*	Δ
1892.64	318.6	2.21	2*n*	T
1893.69	320.4	2.13	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Se... Δ (**II**)...Pt...O. Stone (2201)...LM...T (3185) ...Glasenapp (**I, III**)...]

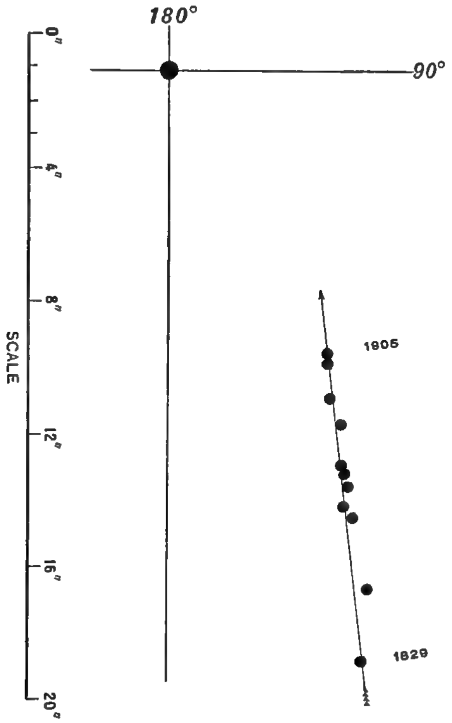
19m 9s **9280.** **A. G. 230.** Double in *A. G. Leiden.* Measures by β^6.

19 19 **9281.** **See 375.** Later measures:

1899.60	167°.4	12″.27	3*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

19 23 **9282.** **Σ 2515.** Rectilinear motion. The apparent annual motion is 0″.12.



Σ 2515.

1829.20	18°.3	18″.74	2*n*	Σ
1852.64	21.1	16.78	2*n*	Ma
1865.03	22.5	14.59	3*n*	Δ
1867.08	22.1	14.21	2*n*	Δ
1872.74	23.5	13.68	1*n*	Δ
1877.68	23.7	13.23	4*n*	Sp
1878.65	23.8	12.98	2*n*	β
1888.61	26.1	11.89	2*n*	Hl
1894.70	26.3	11.01	2*n*	Gla
1903.58	28.8	10.05	2*n*	Do
1905.80	29.6	9.84	2*n*	β

In 1877 Schiaparelli thought B was elongated in 50°. I found it apparently single with the 40-inch in 1901.

[Ma (*F. S.* **II**)... Ma (**XIII, XV**)... Δ (1573)... Δ (**II**)... Flm... Pt... Sk²... Sp (**II**)... β¹... Hl (**II**)... Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Do (3931)... Furner and Storey (*Mon. Not.* **LXIV**, 448)... β⁶...]

19 33 **9285.** **Schj 21.** From list of new pairs by Schjellerup (1485). Measures by β^5.

9286. **H 2870.** The 40-inch shows a new and nearer companion. 19m 40s

A*a*	1905.52	154°.8	4″.44	2*n*	β^6	...13.5
AB	1905.52	166.2	15.07	2*n*	β^6	10.1...10.4
BC	1905.52	106.3	12.07	2*n*	β^6	...11.2

9287. **Σ 2517** *rej.* Measures by β^5. No other observations. 19 40

9288. **Ho 448.** Fixed. 19 41

1904.55	359°.5	7″.50	3*n*	Doo

Doolittle (*Pub. Flower Obsy.* II) finds the small star, DM (23°) 3653, to be a close pair. This is 1m 3s *f* and 9′ *s* of Ho 448; not given in Part I.

1904.56	251°.6	1″.00	1*n*	Doo	9.5...11.0

[Ho (3234)...]

9291. **OΣ 372.** No change. 19 48

		A and B		
1867.93	57°.2	79″.49	3*n*	Δ
1898.51	56.9	79.02	3*n*	Hu
		B and C		
1868.57	295°.8	3″.70	4*n*	Δ
1898.55	294.8	3.54	4*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX, X**)... Δ (**I**)... Flm... Hu (*Pub. L. O.* **V**)... Renz (*Bul. St. P. Acad.* 1892)... Do (3931)... Doolittle (*Pub. Flower Obsy.* **II**)...]

9292. **Σ 3111.** No change. 19 57

1869.84	117°.9	2″.30	4*n*	Δ
1894.63	120.7	2.44	2*n*	Gla
1905.76	116.6	2.50	1*n*	β

[Ma (*F. S.* **I**)... Δ (**II**)... Cin⁵... Glasenapp (**III**)... β⁶...]

9293. **O. Stone 46.** From Cin⁶. Not identified in any star catalogue, and place seems to be approximate or uncertain. Nothing of this magnitude in or near this place in SD. I failed to find it with the 40-inch in 1901. 20 .

[Cin⁶... β⁵...]

9294. **4** *Vulpeculae.* **H 2871.** "Two more near; one extraordinarily faint." The principal star has a proper motion of 0″.081 in 143°.5 (Auwers). The only observations are the following: 20 12

1887.79	107°.7	26″.18	3*n*	HΣ	...10.0
1901.49	106.4	24.89	2*n*	β	...11.0

[HΣ (**XII**, p. 106)... β⁵...]

(See p. 1081)

9296. **β 423.** Discovered with the 6-inch. Apparently without material change. 20 18

1886.78	124°.3	1″.27	1*n*	LM
1893.68	125.4	1.09	2*n*	Sellors
1897.70	124.9	1.31	1*n*	See
1898.63	126.5	1.26	3*n*	Doo

[β (**VII**)... β (2103)... Cin⁴... Cin⁶... LM... Sellors (3240)... See (3496)... Doolittle (*Pub. Flower Obsy.* **I**)...]

20m 18s **9297.** **H̶ VI. 48.** "Identification very precarious." The place in the *Synopsis* is 13′ *s* of that given here. The components are DM (1°) 3995 and 3996, and the distance agrees with Herschel's Class VI.

1904.66	174°.2	153″.51	2*n*	β^6	8.5...9.2

The 8.6 m star, DM (1°) 3993, which is 22^s *p* and 3′ *s*, has a companion, 327°.4 : 33″.96 (1904.50) 2*n*.

20 18 **9298.** **Σ 2518.** Very little, if any, change.

1866.97	357°.5	4″.94	3*n*	*Δ*
1905.55	355.4	4.94	2*n*	*β*

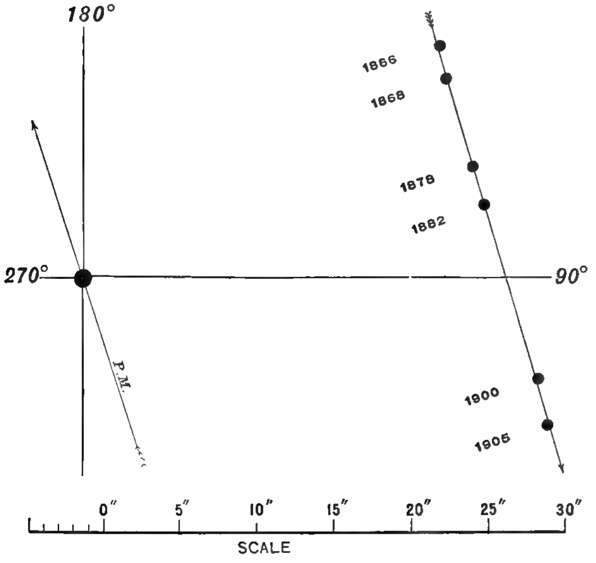
[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Cin⁵...β⁶...]

20 23 **9299.** *ν Aquilae.* Measured in looking for H̶ IV. 33. (No. 9342.) B is DM (0°) 4204. The proper motion of A is 0″.024 in 359°.7 (Auwers). The A. G. positions give 288°.6 : 201″.4 for the position of B. There are many small stars nearer A.

[β⁵...]

20 28 **9300.** 3 *Cygni.* Called 3 *Cygni* by OΣ, but according to Argelander, Heis, and others it is in *Vulpecula.* This has a large proper motion:

Auwers	0″.658 in 198°.1
Paris	0.655 in 196.9
Measures of B	0.652 in 196.0



3 Cygni.

The following are all the measures:

1866.72	122°.8	27″.91	1*n*	OΣ
1868.76	118.5	27.18	1*n*	OΣ
1878.54	105.6	26.55	1*n*	OΣ
1882.61	100.1	26.66	1*n*	OΣ
1900.85	77.1	30.54	3*n*	*β*
1905.76	72.2	31.87	2*n*	*β*

[OΣ (**X**)...β⁵...β⁶...]

9301. **OΣ 373.** Apparently fixed. 20m 34s

1868.99	229°.0	1″.75	5*n*	*Δ*
1898.51	233.2	1.81	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

9302. **Σ 2526.** No material change. 20 36

1868.33	85°.2	17″.08	4*n*	*Δ*
1905.69	85.4	16.91	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...*Δ* (**II**)...β⁶...]

9304. **H 1395.** "Very fine neat star." Examined, and distance fully 2½″; magnitudes 8.5...8.5 (1875). In DM 8.4 m. "Double" in *A. G. Lund.* 20 52

1880.51	244°.7	2″.76	2*n*	Big	9 ...9
1901.55	65.2	3.09	1*n*	Es	9.0...9.2

[Big....Cin⁵...Espin (*Mon. Not.* **LXIV**, 679)...]

9305. **Σ 2522.** *Cygni* 18. Fixed. 21 1

1868.64	339°.2	4″.47	4*n*	*Δ*
1905.76	339.2	4.48	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...*Δ* (**II**)...Cin⁵...Glasenapp (**V**)...β⁶...]

9306. **H 5119.** "Very neat star." Unchanged. 21 7

1856.65	290°.7	5″.56	1*n*	Se¹	9...9
1903.69	292.5	5.22	1*n*	β^6	

9307. **Σ 2520.** Fixed. 21 14

1867.23	233°.4	1″.88	3*n*	*Δ*
1893.68	237.9	1.77	2*n*	Gla

[Ma (*F. S.* **I**)...Se...*Δ* (**II**)...Cin⁵...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

9308. **Σ 2521.** (= **H̶ N. 85.**) No measures by H̶. Rectilinear motion. 21 14

1829.40	43°.6	22″.65	3*n*	Σ
1851.89	40.9	23.36	2*n*	Σ
1864.63	40.9	23.69	4*n*	*Δ*
1867.74	39.9	23.92	2*n*	OΣ
1878.54	38.7	23.79	1*n*	OΣ
1886.59	39.1	24.63	4*n*	Per
1890.73	39.0	24.51	2*n*	Maw
1895.58	38.1	24.54	2*n*	Gla
1905.60	38.3	24.67	2*n*	*β*

[Ma (*F. S.* **II**)...Ma (**XIII**)...H (**V, VII**)...OΣ (**IX, X**)...*Δ* (1573)...*Δ* (**II**)... Flm...Bl (**V**)...P. Smythe (*Mon. Not.* **XXII**, 8)...Per...Pt...Do (3023, 3931) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Maw (**I**)... Glasenapp (**IV**)...β⁶...]

9309. **Hd Zones.** "Double?" in *Harvard Zones.* Looked at in 1902, and not double unless a very distant companion is referred to. 21 14

9313. **Schj 22.** (= **β 142.**) Found with the 6-inch, and given in *β* (III) before I was aware of the fact that it had been discovered and published long before by Schjellerup. 21 30

The measures show slow, direct angular movement. Lalande 36712. Some of the later measures are:

1878.89	319°.6	1″.37	3*n*	Cin
1879.16	319.5	1.58	4*n*	Sp
1882.54	324.3	1.68	4*n*	Wilson
1883.62	325.8	1.10	3*n*	Ho
1888 54	328.3	1.60	3*n*	Lv
1888.70	326.3	1.47	3*n*	T
1894.69	332.0	1.54	5*n*	Lv
1898.01	333.0	1.54	6*n*	Scott
1902.56	336.7	1.58	6*n*	Doo
1905.48	338.3	1.84	3*n*	Doo

[Schj (1485)...β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...Cin5...Sp (**II**)...Wilson (Cin10)...Ho (2978)...LM...Lv1...Lv (*Sid. Mess.* **VIII**, 77)(*A. J.* 382, 407)...T (2991)...Soulé (*A. J.* 410)...Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

21m 37s **9315.** **Σ 2523.** (= **H III.** 57 = **Sh** 295.) Fixed.

1866.68	149°.4	6″.41	3*n*	Δ
1885.14	149.4	6.51	2*n*	Per
1893.68	148.2	6.14	2*n*	Gla

[Ma (**IX, X, XIII**)...Ma (323)...Ma (*F. S.* **I**)...Se...Wr...Bp...Da3...Da4...Ra (**XXIII**)...Ba (**II**)...Du...Ferr...Δ (1194)...Δ (**I, II**)...WS...WS2...Gl...Per...Per (2749)...Glasenapp (**III**)...Do (3680)...*Annals Toulouse Obsy.* **III**...]

21 39 **9316.** **Σ 2519.** (= **Sh** 294.) Fixed.

1866.35	124°.9	11″.28	3*n*	Δ
1890.55	124.5	11.41	5*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Se...Ra (**XXIII**)...Δ (1209)...Δ (**I, II**)...Giacomelli (**III**)....O. Stone (2201)....Pt....LM....*Annals Toulouse Obsy.* **III**....]

21 39 **9317.** **β 1286.** The wide pair is noted in W² as "duplex; 10″." The close attendant to B was found with the 40-inch. The change shown by the measures in the angle of AB seems to be due to a proper motion of about 0″.18 in B, nearly at right angles to the line of AB. This explains the change in BC. In a few years this will become an easy pair so far as the distance is concerned.

A and B

1899.48	118°.5	5″.90	3*n*	β	8.6...9.3
1904.87	107.3	6.20	3*n*	Doo	8.0...9.0
1905.45	108.0	6.06	3*n*	β	

B and C

1899.48	67°.4	1″.59	3*n*	β	9.3...12.5
1905.74	117.2	0.62	2*n*	β	

[β (*Pub. Y. O.* **I**)...β6...]

(See p. 1081)

21 39 **9318.** **Σ 2524.** (= **H N.** 100.) Perhaps a little change in angle.

1868.15	101°.5	6″.84	4*n*	Δ
1888.62	100.1	6.83	2*n*	Hl
1893.73	98.1	6.67	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Wr...Se...Du...Flm...Sk2...Δ (**II**)...Cin5...Hl (**II**)....Glasenapp (**III**)....Collins (*A. J.* 378)....*Annals Toulouse Obsy.* **III**...]

9319. **Σ 2525.** A binary of long and uncertain period. 21m 40s It has been a difficult pair to measure for the last thirty years, but the distance is increasing, and it is now within the reach of moderate apertures. Since the first measures of Struve, the companion has moved more than 300° in position-angle. The orbit, however, is still uncertain, as there is nothing in the measures to fix the maximum separation in the third or fourth quadrant, and the limit of the apparent ellipse on the preceding side. The period cannot be certainly, or even approximately, known until nearly one revolution has been made.

The following are all the measures:

1830.43*	255°.9	1″.33	5*n*	Σ
1836.14*	255.5	1.30	2*n*	Σ
1840.62	255.5	....	1*n*	Da
1840.70*	252.4	1.28	2*n*	OΣ
1842.41*	251.0	0.82	1*n*	Ma
1843.69*	254.0	0.95	1*n*	Ma
1854.63*	246.8	1.05	1*n*	OΣ
1856.61*	247.1	0.85	2*n*	Se
1865.22*	240.9	0.6±	7*n*	Δ
1865.48	253.6	0.73	2*n*	En
1865.64	239.9	0.40	1*n*	Se
1865.76*	241.5	0.74	2*n*	OΣ
1872.61*	234.0	0.66	1*n*	OΣ
1873.54	241.1	....	1*n*	Ferr
1873.61*	233.4	0.6±	4*n*	Δ
1873.65	232.1	....	3*n*	WS
1874.84*	234.3	0.48	1*n*	Gl
1875.66	233.6	....	1*n*	WS
1875.65*	232.1	0.45	5*n*	Sp
1877.01*	230.1	0.37	5*n*	Sp
1877.82	238.0?	....	1*n*	Δ
1879.71*	213.2	0.33	3*n*	Hl
1879.79	243.0	....	3*n*	Do
1880.67*	217.8	0.32	8*n*	Sp
1880.71	210.0	....	2*n*	Do
1883.26	47.9	0.23	8*n*	En
1883.63*	200.0	0.35	4*n*	Sp
1883.58	Elong. 27°		4*n*	Per
1886.92	208.6	0.2±	2*n*	Sp
1887.71	Single		4*n*	Sp
1889.78*	24.1	0.15±	1*n*	HΣ
1891.46*	343.4	0.18	4*n*	β
1891.56	342.2	0.3±	1*n*	Ho
1891.77	346.8	0.2±	1*n*	HΣ
1892.42*	328.3	0.27	1*n*	β
1893.80*	329.6	0.31	3*n*	Com
1895.65*	327.5	0.37	1*n*	Dyson
1895.68*	325.3	0.35	2*n*	Lewis
1895.67	319.8	0.35±	2*n*	Gla
1895.68*	327.3	0.38	3*n*	Com
1896.66*	326.4	0.41	3*n*	Com
1896.69	327.2	0.51	4*n*	Lewis
1897.60*	322.2	0.48	3*n*	A
1897.69	323.9	0.39	5*n*	Lewis
1897.87	292.6	....	4*n*	Sk
1898.62*	317.3	0.50	3*n*	Lewis
1898.72*	320.2	0.44	1*n*	Brown
1898.74*	319.8	0.39	1*n*	Bryant
1898.82	314.5	0.5±	3*n*	Sk
1899.62*	319.9	0.46	3*n*	A
1899.62*	317.2	0.42	3*n*	Bowyer
1899.68*	319.9	0.46	4*n*	Lewis

1899.77	314°4	0″39	1*n*	Bryant
1900.62*	321.7	0.47	2*n*	Bryant
1900.63*	318.4	0.44	2*n*	Do
1901.65*	319.8	0.51	3*n*	Lewis
1901.64*	313.0	0.55	1*n*	Bowyer
1902.61*	313.2	0.43	3*n*	Bowyer
1902.66*	313.3	0.45	1*n*	Lewis
1903.53	307.8	0.78	4*n*	Lohse
1903.61*	317.5	0.58	5*n*	Biesbroeck
1903.66*	308.8	0.61	2*n*	Bowyer
1904.63	311.7	0.56	4*n*	Bowyer
1904.69	337.0	0.73	3*n*	Doo
1904.80	308.7	0.6±	1*n*	Lohse
1905.46*	310.9	0.54	1*n*	A

9320. **Ho 449.** Change in angle? $21^{m}\ 41^{s}$

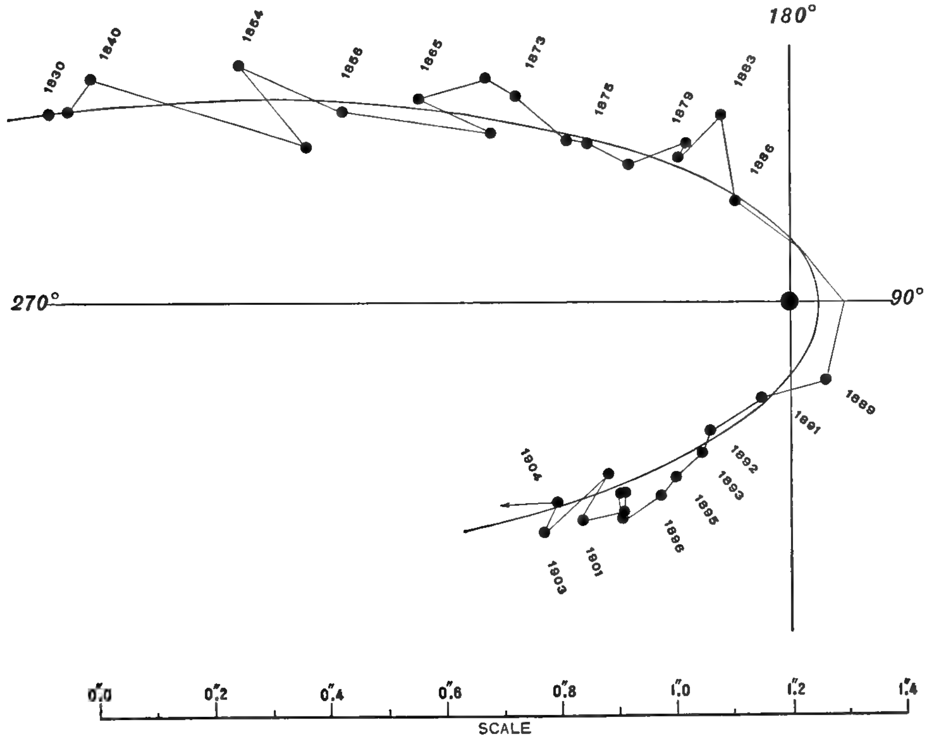
1904.68	174°9	12″71	4*n*	Doo

[Ho (3234)...]

9321. **H 5120.** "Neat star." Fixed. These are all the measures: $21\ \ 49$

1877.73	173°7	3″86	1*n*	Cin	8.0...10.0
1897.70	169.1	4.42	1*n*	See	7.5... 9.5
1903.49	173.5	3.60	3*n*	Doo	

[Cin⁴...See (3496)...Doolittle (*Pub. Flower Obsy.* **II**)...]



Σ 2525.

The measures marked (*) are shown on the diagram. The ellipse is given only as an example of one of the many ellipses which could be drawn, representing the observations equally as well, practically, and giving almost any desired periodic time.

Two orbits have been published:

1892	Gore	138.54 years	*Mon. Not.* LIII, 44
1902	Bowyer	306.7	*Mon. Not.* LXIII, 334

[**Ma** (*F. S.* **I**)...Ma (**X, XI**)...Bp...Da³...Se...Se²...OΣ (**IX**)...Flm...Δ (1209, 1573)....Δ (**II**)....Ferr....En (1674, 2677)....Gl....WS....WS²....Sk....Do (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Do (2307, 3023, 3680)...Sp (2133)... Sp (**II, II** App.)... Per... Per (2559)... Hl (*Wash. Obsns.* 1886) ... Hl (**I, II**) ....Gore (*Mon. Not.* **LIII**, 44).... Ho (3234)....β (3114, 3142)(*Pub. L. O.* **II**) (*Mon. Not.* **LII**, 97) ... Glasenapp (**III, IV**) ... Sk⁵... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 511; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29)...Everett (*Mon. Not.* **LVI**, 464)...Com (**X**)...Brown (3646)... HΣ (**XII**)... Bowyer (*Mon. Not.* **LXIII**, 334) orbit...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...A (3466, 3639)...]

9323. **Ho 106.** Later measures give a larger angle. $21\ \ 54$

1900.50	222°1	1″12	3*n*	A
1904.62	223.6	1.23	3*n*	Doo

[Ho (2779)...A (*Bul. L. O.* No. 11)...]

9324. **Ho 450.** The later observations are: $21\ \ 57$

A and B

1896.26	268°4	0″72	3*n*	Ho
1902.00	266.4	0.95	4*n*	Doo

AB and C

1896.26	73°4	30″05	3*n*	Ho

[Ho (3234, 3558)...]

$22^m\ 1^s$ **9325. Ho 451.** A later position is:

1904.55	297°.6	3″.30	3*n*	Doo

[Ho (3234)...]

22 5 **9326. Σ 2528.** Fixed. Struve mentions a third faint star, 174° : 32″; very plain with 6-inch (1873).

1866.86	244°.5	14″.36	3*n*	Δ
1905.70	244.2	14.39	1*n*	β

The only measure of the third star is:

1905.70	176°.1	32″.53	1*n*	β

[Ma (*F. S.* I)... Ma (XI)... Δ (II)... Cin^5... HΣ (XII)... β^6...]

22 8 **9327. A 159.** (AC = **Σ 2527.**) The duplicity of the principal component of Σ 2527 was discovered by Aitken in 1900 with the 12-inch. No other measures. There is no sensible change in the Σ companion.

1868.20	19°.9	4″.13	4*n*	Δ
1900.61	18.3	4.26	1*n*	A

[Ma (*F. S.* I)... Ma (XI)... Se... Δ (II)... Collins (*A. J.* 378)... A (3741)(*Bul. L. O.* No. 3)...]

22 27 **9330. H N. 119.** (= **Hd 153.**) No measures in H; "double, extremely unequal; position *sf.*" Error of 23′ Decl. in H; identified and measured as given in Part I. There is no doubt of the identity of Hd 153 with this pair. (See No. 9364.)

1877.56	140°.2	8″.23	3*n*	Cin	6.3...9.3
1890.55	141.4	8.08	2*n*	Gla	6.0...9.1
1901.48	141.6	7.76	2*n*	β	6.0...8.2
1903.53	140.0	7.89	3*n*	Doo	6.4...8.9

The principal star is given a proper motion of 0″.066 in 204°.0 (Battermann), and the companion evidently has the same movement.

[Cin^4... Glasenapp (I)... Scott (*Brit. Ast. Ass'n* VI, 368)(*Mon. Not.* **LXIV**, 52) β^5... Doolittle (*Pub. Flower Obsy.* II)...]

22 43 **9334. Σ 2529.** Fixed.

1867.44	296°.9	6″.59	4*n*	Δ
1905.76	296.5	6.86	1*n*	β

[Ma (*F. S.* I)... Ma (XI, XIII)... Se... Δ (II).... Glasenapp (IV)... β^6...]

22 54 **9335. H 887.** The large star is variable, and called *U Aquilae* in Rad^3., with a proper motion of 0″.054 in 303°.9.

1900.47	348°.7	35″.31	2*n*	β^5	7.0...13.2

22 58 **9337. Σ 3132.** Fixed. The measure of this pair in Se is called Σ 2530.

1867.56	39°.6	7″.34	3*n*	Δ
1905.55	41.8	7.38	1*n*	β

[Ma (*F. S.* II)... Ma (XI)... Se... Δ (II)... Cin^5... β^6...]

9341. β 424. Discovered with the 6-inch. Without change. $23^m\ 5^s$

1877.14	38°.0	2″.76	4*n*	Δ
1891.77	40.1	2.60	2*n*	β
1899.44	39.5	2.62	2*n*	β
1901.54	40.8	2.78	3*n*	Doo

[β (VII)... β (2103, 3114)(*Pub. L. O.* II)... Δ (I)... Doolittle (*Pub. Flower Obsy.* II)...]

9342. H IV. 33. H describes this as "the first of 2 stars *p ν Aquilae;* distance of the two nearest 21″.98, inaccurate." After a very careful examination, I am certain that the star which he calls *ν Aquilae* is really the 6.9 m star, DM (− 0°) 3760, which follows the other $2^m\ 47^s$. The description then applies perfectly. The faint pair is not in the DM. The place given in Part I is that of the bright star. 23 9

1901.47	335°.7	13″.04	2*n*	β^5	9.5...9.7

9343. Σ 2530. Fixed. The measure in Se belongs to Σ 3132, which is near this place. The principal star has a proper motion of 0″.094 in 217°.6 (*A. G. Berlin*). 23 9

1867.38	155°.7	5″.47	3*n*	Δ
1880.47	156.4	5.50	1*n*	β
1905.55	153.2	5.32	1*n*	β

[Ma (*F. S.* I)... Ma (XI)... H (V)... Du... En (1674)... Δ (II)... β^3... Collins (*A. J.* 378)... Kustner (3821)... β^6...]

9344. Σ 2534. (= **H II. 69 = Sh 296.**) Fixed. 23 22

1866.73	64°.9	6″.84	3*n*	Δ
1875.62	64.8	6.75	4*n*	Sp
1894.55	63.3	6.76	2*n*	Gla

[Ma (*F. S.* I)... Ma (XI, XIII, XV)... Bp... Wr... Se... Ra (XXI)... Hd... WS ... Gl... Bl (V)... Δ (1209)... Δ (I, II)... Sp (II)... Glasenapp (III)... *Annals Toulouse Obsy.* III...]

9347. Σ 2531. (= **H 598.**) Fixed. 23 29

1867.23	29°.6	31″.49	3*n*	Δ
1905.28	30.3	31.17	1*n*	β

[Ma (*F. S.* I)... Ma (XI)... Δ (II)... Cin^5... β^6...]

9349. OΣ (App) 182. The larger star is given a proper motion of 0″.085 in 54°.3 (*A. G. Harvard*). There are two small stars near A. 23 37

AB	1901.50	305°.6	71″.80	3*n*	β	
A*a*	1901.53	113.9	12.47	1*n*	β	...14
A*b*	1904.43	139.2	31.73	2*n*	β	...10.5

There is also a small nebula in the field; from A in the direction of 247°.3, and from B in 221°.0.

[Δ (I)... Franz (3080)... β^5... β^6...]

9350. 6 and 8 *Vulpeculae.* **Σ 42, App. I.** Increase in the distance from proper motion. A is α *Vulpeculae* of some catalogues. There is a small star between the two bright stars. The proper motions are given by Auwers: 23 43

6 *Vulpeculae* = 0″179 in 235°3
8 *Vulpeculae* = 0.032 in 202.3

1868.22	27°8	402″78	6n	Δ
1877.62	27.8	403.45	3n	Je
1891.56	28.0	405.95	3n	Mai

Doolittle measures a new pair 1^m 29^s *f* and 30′ *n* of 6 *Vulpeculae*:

1904.65	322°0	0″93	1n	Doo	10.0...11.0

[Ra (**XXVI, XXVIII**)....Δ (1574)....Δ (**II**)....Je (2341)....Maiebckato (*Obsns.* 1892)...Glasenapp (**III**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

$23^m\,45^s$ **9351. A 160.** No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

23 54 **9352. Σ 2533.** (= **H 267.**) *White: purple*, H. Fixed.

1866.23	211°8	22″86	3n	Δ
1905.60	212.1	22.66	2n	β

[Ma (*F. S.* **II**)...Ma (**XI, XIII, XV**)... Mh...Δ (**II**)... Glasenapp (**II**). .*Annals Toulouse Obsy.* **III**...β^6...]

23 57 **9353. A. G. 231.** Double in *A. G. Berlin.* Measures by Hussey (*Bul. L. O.* No. 44).

24 9 **9355. Σ 2532.** *Yellow: blue*, H (V). The distance is decreasing.

1866.90	5°2	34″23	3n	Δ
1905.66	4.8	33.66	3n	β

[Ma (*F. S.* **I**) ...Ma (**XI**)...H (**V**)... Bl (**V**)...Δ (**II**)...Cin^5...β^6...]

24 11 **9356. Hd Zones.** Noted as having two companions, 10″ and 15″ in *Harvard Zones.* The only measures are:

AB	1904.50	219°3	12″81	2n	β^6	9.5...11.7
AC	1904.50	153.0	18.58	2n	β^6	...11.7

24 13 **9357. H 888.** In H (IV) 232°0 : 6″: 10...11. The magnitude in DM is 9.5.

24 28 **9358. Ho 578.** The principal star has a considerable proper motion:

Porter	0″188 in 233°1
Bossert	0.220 in 251.4
Paris	0.149 in 224.2

This movement does not appear to belong to the small star.

1904.35	108°3	22″83	2n	β
1905.62	109.7	22.98	5n	Doo

[Ho (3557)...β^6...]

24 26 **9359. H 2875.** In SD 8.8 m.

1900.67	333°0	10″63	1n	Hu	9.0...9.5

H 1403 (No. 9363) and H 1412 (No. 9410) are probably identical with this pair.

[See (3496)...Hu (*Bul. L. O.* No. 44)...]

9360. H 889. "Double; in the field with H 888." Examined and estimated, 105°:15″:9...12. There is a very faint nebula about 5′ *s* and a little *f* (1873). The magnitude in DM is 8.5. $24^m\,29^s$

9361. See 381. Other measures: 24 46

1899.49	13°5	1″59	3n	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9362. Σ 2614. Probably unchanged. The following are all the measures: 24 50

1831.30	250°9	....	1n	H
1833.25	253.0	1″26	3n	Σ
1869.78	244.2	1.42	4n	Δ
1896.59	235.5	1.61	3n	Lv
1902.61	239.1	1.39	1n	Hu
1905.94	245.6	1.55	2n	Doo

[H (**V**)...Δ (**II**)... Flm...Lv (*A. J.* 407)...]

9363. H 1403. This is identical with H 2875 (No. 9359). 24 55

9364. Hd 153. There is no double star in the Hd place. It is identical with H N. 119 (No. 9330.) 25

9365. Δ 20. (AC = **Σ 2535.**) The close pair was discovered by Dembowski in 1865. The motion, if any, is very slow: 25 1

1890.70	66°9	1″04	3n	β	7.3... 9.0
1900.50	66.4	1.40	2n	A	7.3...10.0
1901.67	67.0	1.35	2n	β	7.0...10.1

The distance of C is less than given by Σ, and is probably decreasing.

1868.52	297°9	26″30	6n	Δ
1890.70	298.0	26.21	3n	β
1900.49	297.5	25.78	1n	A
1901.65	298.4	25.94	3n	β

Dembowski suspected another close companion, but as the 18½-inch and the 36-inch failed to show it, it probably does not exist.

[Ma (*F. S.* **II**)...Ma (**XIII, XV**)...Δ (1573)...Δ (**II**)...Flm...Sp (**II**)...T (2991, 3186)....Cin^5....Glasenapp (**I**)....β^3....β (3048)(*Pub. L. O.* **II**)....A (*Bul. L. O.* No. 11)...β^5...]

9367. Hn 152. Discovered at the Washburn Observatory. No other measures. The estimated distance at the time of discovery was 1″5. There is a 12.8 m star, 348°6 : 34″5 (1903). 25 4

[Hn (*Wash. Obsns.* **II**)...β^6...]

9371. A 269. No other measures. 25 40

[A (3784) (*Bul. L. O.* No. 16)...]

25ᵐ 44ˢ **9372.** **β 651.** Discovered with the 18½-inch. This is 19′5 *n* of β *Cygni*. Probably unchanged. The later measures are:

1892.38	288°6	6″44	2*n*	β
1899.70	287.1	6.69	6*n*	Doo
1903.97	286.9	6.61	5*n*	Doo

[β (**X**)...β¹...β (3142)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

25 53 **9374.** **β** *Cygni*. **Σ 43, App. I.** (= **H V. 5** = **Sh 297** = **OΣ (App) 183.**) Relatively fixed. The bright star has a very small proper motion, 0″016 in 270°0 (Auwers).

1840.65	55°4	34″42	2*n*	OΣ
1868.98	55.7	34.51	5*n*	Δ
1884.94	55.1	34.57	8*n*	Hl
1896.49	55.5	34.69	4*n*	Hu

[H¹...H²...Bes...Da¹...K (409)...Wr...Ek (**I**)...Fl...Se¹...Auwers (1393)...Bond (*Am. Acad.* **II**, 144)...Ra (**XXI, XXIV, XXVI, XXVIII, XXIX, XXXIV, XXXV**)...Wh...Lu (1193)...Lu (**I, II, III**)...Schmidt (1543)...Amici (2155) Δ (**II**)...OΣ (**X**)...Kn...WS...Hd...Pk...Flm (*L'Astronomie*, **IV**, 447)...Je (2341, 2449)...Jacoby (*A. J.* 265, 287, 288, 293) parallax...Franz (2590)...T (2866)...Hl (*Wash. Obsns.* 1883–84, 1886)...Hl (**II**)...Maiebckato (*Obsns.* 1892)...β²...Chase (*A. J.* 307) parallax...Maw (**I**)...Glasenapp (**III**)...Cohn (3240)...Hagen (3258)...Hu (*A. J.* 397)...Franz (3464)...Lewis (*Mon. Not.* **LX**, 511; **LXII**, 383)...]

25 58 **9376.** **Ho 452.** Unchanged.

AB	1904.69	245°8	6″54	3*n*	Doo
AC	1904.69	181.3	19.32	3*n*	Doo

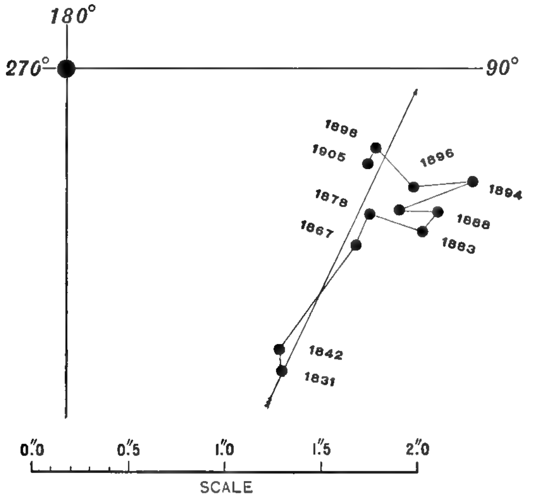
[Ho (3234)...]

26 **9377.** **Lewis 29.** Approximate place.

1899.60	344°0	11″32	1*n*	Bryant

[Lewis (*Mon. Not.* **LIX**, 421; **LX**, 511)...]

26 16 **9381.** **Σ 2536.** The change appears to be due to proper motion. The measures are unusually discordant for so easy a pair.



Σ 2536.

The complete measures are as follows:

1831.17	35°5	1″95	4*n*	Σ
1842.71	37.3	1.85	1*n*	Ma
1867.67	58.5	1.78	4*n*	Δ
1878.70	64.5	1.76	1*n*	β
1883.73	65°5	2″05	7*n*	En
1888.11	68.9	2.09	5*n*	HΣ
1888.64	67.0	1.90	3*n*	Hl
1894.71	74.5	2.21	1*n*	Big
1896.61	71.1	1.93	4*n*	Lewis
1898.88	75.6	1.68	3*n*	Bryant
1905.60	72.3	1.66	2*n*	β

Lewis measures a pair of small stars 15ˢ *f* and 16′ *n*:

1895.72	141°0	4″54	1*n*	Lewis	10.0...11.0

[Ma (*F. S.* **I**)...Ma (**X**)...Δ (1573)...Δ (**II**)...Flm...β¹...Gore (*Mon. Not.* **XLVII**, 62)...En (2677)...Hl (**II**)...Big (*Bul. Ast.* **XII**, 299)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 511; **LXVI**, 29)....HΣ (**XII**)....β⁶...]

(See p. 1081)

9382. **β 650.** Discovered with the 18½-inch. The measures at the Greenwich Observatory are from photographs. 26ᵐ 20ˢ

A and B

1898.52	145°4	6″43	3*n*	Doo
1899.63	148.6	6.80		Gr. Obsy.
1905.55	144.0	6.56	3*n*	Doo

A and C

1898.52	331°8	11″59	3*n*	Doo
1899.63	327.5	11.43		Gr. Obsy.

A and D

1898.52	253°3	26″67	3*n*	Doo
1899.63	254.4	27.04		Gr. Obsy.

[β (**X**)....β¹....β (3114)(*Pub. L. O.* **II**)....Doolittle (*Pub. Flower Obsy.* **I**)....Greenwich Obsy. (*Mon. Not.* **LX**, 519)...]

9383. **H 2877.** Probably fixed. 26 24

1878.49	74°8	24″16	2*n*	Cin	8.2...8.7
1890.53	73.8	23.39	2*n*	Gla	8.5...9.1

[Cin⁵...Glasenapp (**I**)...]

9384. **β 976.** *Aquilae* **122.** Discovered with the 18½-inch. Lalande 36963. The later measures show no sensible change. 26 27

1889.87	106°0	2″18	1*n*	Sp
1891.42	104.3	2.16	3*n*	β
1902.97	103.6	2.29	3*n*	Doo

[β (**XIII**)...β³...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9386. **H 5128.** The following are all the observations: 26 36

A and B

1879.45	110°3	20″94	1*n*	Cin⁵	8.0...10.0
1901.59	111.2	20.98	2*n*	β⁵	8.4...10.1

B and C

1901.59	126°3	4″23	2*n*	β⁵	...10.3

A and B are SD (18°) 5113 and 5114.

9387. **β 143.** Discovered with the 6-inch. Probably fixed. 26 39

1893.51	192°9	2″15	3*n*	Lv	7.8...8.7
1898.45	193.2	2.21	3*n*	Doo	9.0...9.6

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1081)

$26^{m}\ 47^{s}$ **9388.** **H 1409.** Fixed.

1873.49	358°.4	13″.49	1*n*	*Δ*	9.0...9.2
1905.58	358.5	13.63	1*n*	*β*	

[*Δ* (I)...Big...*β*6...]

27 3 **9391.** **β 438.** (ACD = **Σ** 2538 = **S** 719.) The faint attendant to the principal star of the triple, Σ 2538, and the little star between the two pairs, were discovered with the 18½-inch. There is no change in the relation of the original components. A few only of the measures are given to show their relative fixity. The measures at the Greenwich Observatory are from photographs.

A and B

1879.46	40°.9	4″.37	1*n*	*β*
1891.53	40.5	4.05	2*n*	*β*
1899.77	31.2	4.63		Gr. Obsy.
1905.81	38.2	4.47	2*n*	*β*

A and C

1891.52	236°.7	21″.52	2*n*	*β*
1899.70	237.6	21.18		Gr. Obsy.

A and D (= Σ 2538)

1830.85	245°.2	53″.04	2*n*	Σ
1866.35	247.4	52.86	3*n*	*Δ*
1886.57	246.1	52.91	3*n*	Per
1891.53	246.0	53.04	2*n*	*β*
1899.70	246.2	52.63		Gr. Obsy.

D and E

1866.35	53°.3	6″.08	3*n*	*Δ*
1886.57	51.3	6.05	3*n*	Per
1891.51	53.8	6.06	2*n*	*β*
1899.70	53.2	6.03		Gr. Obsy.

A and E

1883.70	246°.8	47″.13	1*n*	En
1891.51	247.9	46.94	2*n*	*β*
1899.70	247.9	46.80		Gr. Obsy.

[*β* (**VIII**)...*β* (*Am. Jour. Sci.* July 1877)...*β*1...*β*3...*β* (3114)(*Pub. L. O.* **II**)...Greenwich Obsy. (*Mon. Not.* **LX**, 511, 518)...*β*6...]

The following include all the other observations of the old stars:

[H (**IV**)...H1...Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)(**X**, pp. 42, 183)...Gl...WS2...Sk2...Se...Per...*Δ* (**I**)...En (2677)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

27 5 **9393.** **H 2880.** (= **Ho 273.**) "Duplex, Cl II" in O. Arg. S. Probably fixed.

1889.04	151°.2	3″.63	3*n*	Ho	8.5...8.5
1902.64	150.1	3.97	3*n*	Doo	

[Ho (2977)...Glasenapp (**I**)...]

27 16 **9394.** **β 652.** (AC = **Σ** 2539 = **♅ II.** 99 = **S** 718.) The faint companion to the principal star of Σ 2539 was discovered with the 18½-inch.

A and B

1884.24	325°.3	5″.29	3*n*	HΣ
1892.38	325.3	5.17	3*n*	*β*
1899.80	323.5	5.22	1*n*	Doo

There is no change in AC since the first measures of Struve.

A and C (= **Σ** 2539)

1830.69	5°.2	5″.36	4*n*	Σ
1867.03	2.4	5.38	3*n*	*Δ*
1878.73	3.8	5.60	4*n*	*β*
1887.78	2.8	5.34	4*n*	T
1892.38	3.5	5.40	3*n*	*β*
1899.74	3.4	5.54	4*n*	Doo

[*β* (**X**)...*β*1...*β*3...*β* (*A. J.* 268)...*β* (3142)(*Pub. L. O.* **II**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

General references:

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se...Gl...WS2...*Δ* (**II**)...T (2898)...Greenwich Obsy. (*Mon. Not.* **LIX**, 421; **LX**, 511)...]

9395. **Σ 2537.** Fixed. $27^{m}\ 18^{s}$

1866.74	132°.5	19″.38	3*n*	*Δ*
1892.69	133.6	19.02	2*n*	Gla

[Ma (*F. S.* **I**)....Ma (**XI**)....Mh....*Δ* (**II**)....Cin5....Glasenapp (**II**)....*Annals Toulouse Obsy.* **III**...]

9397. **Ho 107.** Probably fixed. 27 26

AB	1895.70	107°.9	5″.44	2*n*	Ho
	1904.65	104.9	5.65	3*n*	Doo
AC	1895.70	190.3	25.11	2*n*	Ho
	1904.65	187.3	25.61	3*n*	Doo

[Ho (2779, 3234, 3558)...]

9399. **OΣ 374** *rej.* Rejected in second edition of the *Poulkowa Catalogue.* No change. 27 51

1879.49	297°.7	18″.39	1*n*	*β*
1898.62	297.3	19.05	3*n*	Hu

[Ma (**XI, XIII**)...*Δ* (**I**)...*β*3...Hu (*Pub. L. O.* **V**)...]

9400. **See 383.** Cogshall was unable to find this pair in 1899. 28 :

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9401. **Σ 2540.** Unchanged. The principal star is given a proper motion of 0″.057 in 357°.2 (*A. G. Berlin*). 28 3

1867.88	147°.5	5″.02	4*n*	*Δ*
1893.73	146.8	4.86	2*n*	Gla

[H1...Ma (**XI, XIII**)...Ma (*F. S.* **I**)...H (**V**)...Se...*Δ* (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

9404. *μ Aquilae.* **β 653.** These faint companions were discovered with the 18½-inch. The change in the distance from the primary is the result of the proper motion of A, which is given, 0″.233 in the direction of 124°.7 (Auwers). There seems to be no relative change in BC. 28 14

A and B

1878.07	274°.9	21″.42	1*n*	*β*
1891.43	276.6	24.98	2*n*	*β*
1896.49	278.2	26.56	2*n*	Lv
1898.57	278.3	27.29	3*n*	A

A and C

1878.62	285°.7	21″.18	2*n*	β
1891.43	288.4	25.12	2*n*	β
1896.49	289.0	26.58	2*n*	Lv
1898.57	288.9	27.13	3*n*	A
1903.63	291.2	27.84	3*n*	β

B and C

1891.43	195°.7	5″.06	2*n*	β
1898.57	196.4	5.22	3*n*	A
1903.63	196.3	5.42	3*n*	β

There is a 12.8 m star from A, 39°.4 : 38″.1. Engelhardt measures two distant stars:

A and D

1887.65	349°.7	59″.60	1*n*	Eng	...12.5
1899.55	347.5	60.94	1*n*	β	
1903.66	346.6	61.90	2*n*	β	...10.9

A and E (= DM (7°) 4134)

1887.65	71°.9	183″.06	2*n*	Eng	...9.6
1894.71	71.3	182.15	2*n*	Eng	
1899.55	70.9	180.78	1*n*	β	
1903.66	70.7	180.17	2*n*	β	...9.4

[β (**X**)...β1...β (3114)(*Pub. L. O.* **II**)...Lv (*A. J.* 407)...A (3585)...Engelhardt (**II, III**)...β6...]

$28^m\ 18^s$ **9405.** **H 2882.** "Neat."

1879.53	131°.4	9″.32	2*n*	Cin5	8.2...10.0

(See p. 1081)

28 26 **9406.** **See 384.** Later measures:

1899.57	167°.5	5″.79	3*n*	Cg	7.7...11.2
1900.37	165.7	5.81	3*n*	Doo	6.0...11.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...Doolittle (*Pub. Flower Obsy.* **I**)...]

28 47 **9409.** **Ho 108.** No change by the later measures.

1893.67	44°.7	0″.25±	1*n*	Ho
1905.47	41.7	0.31	5*n*	Doo

[Ho (2779, 3558)...]

28 53 **9410.** **H 1412.** No double star here. It is identical with H 2875 (No. 9359).

[Hu (*Bul. L. O.* No. 44)...]

29 4 **9411.** **Σ 2542.** Fixed.

1866.94	254°.9	11″.47	3*n*	Δ
1905.75	254.3	11.56	1*n*	β

There is a distant star 10.8 m:

1905.75	267°.3	42″.70	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...Glasenapp (**IV**)...β6...]

29 5 **9412.** **Σ 2550.** Fixed. A distant star in Glasenapp.

1868.43	68°.4	1″.96	4*n*	Δ
1894.60	69.8	2.15	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Du...Δ (1209)...Δ (**I, II**)...Knorre (3632)...Glasenapp (**III**)...]

9413. **H 1414.** "Double" in *A. G. Lund.* $29^m\ 9^s$

1905.72	27°.7	15″.80	2*n*	β6	8.7...9.6

9414. **H 1413.** The only observations since H are: 29 14

1880.58	218°.4	8″.38	1*n*	Big	9.0...9.5
1905.72	221.6	8.17	1*n*	β6	9.5...9.8

9415. **OΣ 375.** There may be a little change in the angle, but the measures are not accordant. 29 16

1843.53	119°.5	0″.55±	2*n*	Ma
1847.28	138.3	0.59	4*n*	OΣ
1851.72	126.9	0.28	1*n*	Ma
1870.20	141.9	0.56±	9*n*	Δ
1886.55	145.7	0.71	2*n*	Per
1888.64	146.7	0.51	3*n*	Hl
1899.44	149.5	0.61	4*n*	Hu
1902.66	146.6	0.57	3*n*	Bowyer
1904.62	151.9	0.58	3*n*	Bowyer

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...Se...Newcomb (*Wash. Obsns.* 1874)...Do (2303)...Per ...Hl (**II**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 511; **LXI**, 486; **LXIII**, 403; **LXIV**, 803; **LXVI**, 29)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**)...]

9416. 9 *Vulpeculae.* **β 1130.** The faint companion was discovered with the 36-inch. Auwers gives the proper motion of A, 0″.027 in the direction of 313°.8. The interval between the measures is too short to say whether or not the companion is moving with it. All the other measures are given. 29 19

1898.57	31°.7	9″.19	3*n*	β	...13.3
1898.77	33.0	9.30	3*n*	A	...14.2

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...]

9417. 52 (h^2) *Sagittarii.* **β 654.** Discovered with the 18½-inch. The large star has a proper motion of 0″.043 in the direction of 107°.7 (Auwers). Further measures are necessary to show whether this belongs to both components. The following are all the later measures: 29 24

1878.72	163°.2	2″.64	2*n*	Cin
1889.42	159.1	3.00	4*n*	β
1897.69	164.3	2.89	3*n*	See
1898.73	163.0	3.02	4*n*	Doo

[β (**X**) ... β1... β (2957)(*Pub. L. O.* **II**) ... Cin5 ... See (3496) ... Doolittle (*Pub. Flower Obsy.* **I**)...]

9418. **A 270.** No other measures. 29 26

[A (3784)(*Bul. L. O.* No. 16)...]

9419. **Ho 274.** No change. 29 30

1902.62	72°.1	3″.80	4*n*	Doo

[Ho (2978, 3558)...]

9420. **A 271.** No later measures. 29 31

[A (3784)(*Bul. L. O.* No. 16)...]

$29^m 32^s$ **9421.** **β 1335.** (AB = **Σ 2546** *rej.*) The companion to the smaller component of Σ 2546 *rej.* was found with the 40-inch. No other measures of AB.

A and B

1904.53	11°8	8″33	3*n*	β^6	8.3...10.5

B and C

1904.53	24°2	2″15	3*n*	β^6	...13.0

29 36 **9423.** **Howe 49.** The place in Cin[5] is erroneous. Identified and measured:

AB	1901.66	24°4	6″78	2*n*	β^5	8.8...10.7
AC	1901.66	306.1	32.39	2*n*	β^5	...10.1

29 48 **9424.** **β 53.** Discovered with the 6-inch. No motion.

1891.72	249°6	1″43	3*n*	β	8.8...9.7
1902.30	247.9	1.50	4*n*	Doo	8.9...9.8

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**)... Δ (**I**)...Doolitt'e (*Pub. Flower Obsy.* **II**)...]

29 55 **9427.** **β 655.** (ACD = **Σ 2549** = **OΣ (App) 184.**) In β (X) and *Pub. Y. O.* I the new star is given as a close companion to the preceding of the three stars making Σ 2549, and with an error of 180° in the position-angle. It really belongs to the principal star A. These are all the measures:

A and B

1878.48	332°6	1″93	1*n*	β	...12.5
1905.48	333.4	1.94	2*n*	A	...13.2
1905.72	329.1	2.00	1*n*	β	

There is some change in the large stars, evidently from proper motion.

As there is no material change in DC, the proper motion is in the principal star, and B is moving with it. A, C, and D are respectively Nos. 10572, 10571, and 10570 of *A. G. Hels.*

A and C (= Σ 2549)

1832.24	291°3	21″12	4*n*	Σ
1864.61	289.6	22.32	4*n*	Δ
1878.48	289.4	22.86	1*n*	β
1895.64	288.3	23.58	2*n*	Gla
1896.57	288.6	23.75	2*n*	Lv
1898.59	288.2	24.00	2*n*	A
1898.60	288.6	24.02	1*n*	β

A and D (= Σ 2549)

1832.24	278°8	47″48	4*n*	Σ
1864.61	277.2	48.98	4*n*	Δ
1878.48	276.7	49.79	1*n*	β
1895.64	275.4	50.36	2*n*	Gla
1896.57	275.2	50.62	2*n*	Lv
1898.59	275.2	50.61	2*n*	A
1898.60	275.6	50.22	1*n*	β

D and C

1832.24	89°0	26″88	4*n*	Σ
1864.61	87.1	27.45	4*n*	Δ
1878.48	85.9	27.63	1*n*	β
1898.59	84.9	27.86	2*n*	A

[β (**X**)...β^1....β (*Pub. Y. O.* **I**)...]

General references:

[Ma (*F. S.* **II**)...Δ (1474)...Δ (**II**)...Franz (2649)...Lv (*A. J.* 407) ...Glasenapp (**IV**)...Nobile (*Rend. Accad. Sci.* Napoli, Jan. 1875)...Aitken (   )...]

$29^m 56^s$ **9429.** **See 385.** (AC = **H 2883.**) The other measures are:

AB	1899.59	1°9	4″06	2*n*	Cg	8.0...14.5
AC	1830	303.5	15±	1*n*	H	7.8...12
	1899.59	300.6	27.42	2*n*	Cg	...11.7

[See (*A. J.* 431) ... Cogshall (*A. J.* 486)...]

29 56 **9430.** **A 162.** No other observations.

[A (3741)(*Bul. L. O.* No. 3)...]

30 **9432.** **Σ 2572** *rej.* Nothing since Struve but this:

1905.51	200°1	25″31	1*n*	β^6	...10

30 13 **9434.** **Σ 2541.** Erroneously called H I. 13 by Struve. That pair is identical with Σ 2545. The principal star has a considerable proper motion:

Porter	0″399 in 226°0
Paris	0.378 in 216.4

The apparent movement of the companion is probably rectilinear, but the measures are very discordant in both angle and distance. It appears to be a system of the 61 *Cygni* class.

1831.01	340°0	2″84	3*n*	Σ
1843.63	336.9	2.86	1*n*	Ma
1851.86	338.4	3.61	2*n*	Σ
1867.90	331.5	3.42	4*n*	Δ
1884.67	327.5	3.87	3*n*	Hl
1885.45	328.9	3.57	5*n*	En
1895.64	321.8	3.79	2*n*	Collins
1896.63	333.2	4.32	1*n*	Pt
1897.60	330.7	3.72	2*n*	Gla
1903.44	330.6	4.16	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Se...Ra (**XXI**)...Hd...Flm...WS[2]...Sk[2]... Cin[4]...Cin[5]...Cin[6]...Wilson (Cin[10])...LM...UL...OΣ (**IX**)...Δ (2195)... Δ (**II**)...Hl (*Wash. Obsns.* 1884)... Hl (**II**)... En (2742)...Scott (*Brit. Ast. Ass'n* **V**, 75)...Collins (*A. J.* 378)...Pt (*A. J.* 397)...Glasenapp (**V**)...β^6...]

30 13 **9435.** **A. G. 232.** Double in *A. G. Lund.* Measures by β^6.

30 18 **9438.** **Espin 129.** In another observation the angle is given 225°1 (*Mon. Not.* LXIII, 172).

30 20 **9439.** **Σ 2543.** No material change.

1866.36	155°1	12″82	3*n*	Δ
1891.46	154.9	12.61	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin[5]...β (3114)(*Pub. L. O.* **II**)...]

30 27 **9440.** **β 1257.** Discovered with the 36-inch. In DM 6.8 m.

1898.74	178°6	4″08	2*n*	A	7.0...13.2

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3585)...]

30^m 35^s **9441.** **H 5133.** The magnitude in SD is 9.1.

1879.12	10°.2	21″.29	2*n*	Cin^5	8.2...10.0

30 38 **9442.** **OΣ 376.** No sensible change.

1869.38	233°.0	2″.70	5*n*	Δ
1898.58	233.3	2.65	4*n*	Hu
1903.56	231.6	2.74	2*n*	Do

[Ma (**XI**)...OΣ (**IX**)... Δ (**I**)... Sk^2... Per... En (2678)... Ho (2978)... Big... Hu (*Pub. L. O.* **V**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

30 40 **9443.** **A 163.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

30 55 **9444.** **♅ V. 104.** "Nisi R. A. 19^h 29^m 51^s; Decl. 15° 32′, which may be *σ* 626, with 9′ error in Decl. of Σ's star." Examined and identified as given in Part I.

1893.55	124°.9	39″.27	1*n*	Big	
1901.45	126.1	38.82	3*n*	β	7.3...9.8

[Big (*Bul. Ast.* **XII**, 299)...β^5...]

31 3 **9446.** **A. G. 233.** Noted "obl.?" in *A. G. Berlin.* In 1902 Miller found it single (*A. J.* 546).

31 8 **9447.** Star with a faint double companion near Σ 2541; noted with the 6-inch. B is SD (10°) 5136.

BC	1888.53	282°.9	4″.21	1*n*	Lv

[Cin^5....Lv^1...β^6...]

31 17 **9448.** **Σ 44, App. I.** (= **OΣ (App) 186.**) Without change. B is Rad^1. 4376.

1870.73	286°.9	76″.45	7*n*	Δ
1905.75	286.6	76.12	1*n*	β

[Se^1... Ra (**XXVI, XXVIII**) ... Δ (**II**)... Je (2341) ... Franz (2649) ... Glasenapp (**III**)...Espin (*Mon. Not.* **LXIV**, 678)...β^6...]

31 18 **9449.** **A. G. 234.** Double in *A. G. Lund.* Measures by β^6.

1904.47	328°.9	2″.80	2*n*	Hu	9.0..9.0

31 19 **9450.** **Σ 2544.** Slow retrograde motion in AB; no change in C.

A and B

1828.99	218°.4	1″.14	3*n*	Σ
1856.54	212.7	1.11	1*n*	Se
1867.19	209.7	1.16	4*n*	Δ
1879.68	211.3	0.92	2*n*	Hl
1885.66	208.3	1.03	6*n*	Hl
1893.69	217.3	1.00	2*n*	Gla
1895.65	206.5	1.04	2*n*	Collins
1902.80	205.8	1.06	2*n*	Do

A and C

1867.19	238°.3	15″.75	4*n*	Δ
1886.15	238.6	15.75	4*n*	Hl
1902.80	239.3	15.27	2*n*	Do

[Ma (*F. S.* **I**)... Ma (**X**) ... Se... H (**V**)... Flm ... Δ (1573)... Δ (**II**)... Bl (**V**)... WS^2...Sk...Gl...Sp (**II**)...β^1... Hl (*Wash. Obsns.* 1884, 1886)... Hl (**I, II**) ...Glasenapp (**III**)... Collins (*A. J.* 378) ... Greenwich Obsy. (*Mon. Not.* **LX**, 511; **LXI**, 486; **LXIII**, 403; **LXVI**, 29)...Do (3931)...]

9451. **Σ 2548.** No change. 31^m 28^s

1867.92	101°.8	9″.16	4*n*	Δ
1893.73	99.8	9.20	2*n*	Gla

Doolittle measures a quadruple in the field, 1^s *f* and 54″ *n*, the principal star of which is DM (24°) 3803.

AB	1904.62	145°.6	24″.69	3*n*	Doo	8.7...11.3
AC	1904.62	167.2	43.75	3*n*	Doo	
CD	1904.62	261.4	1.63	3*n*	Doo	10.4...11.3

[Ma (*F. S.* **I**)... Ma (**X, XI, XIII, XV**)....H (**IV**)....Gl...WS....WS^2...Δ(**II**) ....Glasenapp (**III**)....*Annals Toulouse Obsy.* **III**.... Doolittle (*Pub. Flower Obsy.* **II**)...]

9455. **β 761.** Discovered with the 6-inch on Mt. Hamilton in 1879. The other observations are: 31 45

1879.68	197°.4	2″ ±	3*n*	β
1886.71	198.7	2.55	1*n*	Pollock
1896.63	196.0	2.33	3*n*	See

[β (**XI**)... β^2...β (2957)(*Pub. L. O.* **I, II**)... Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* **XLVII**, 473)(*Mem. R. A. S.* **L**)...See (3496)...]

9456. **Σ 2553.** Slow motion in angle, with but little change in distance. 31 49

1830+	78°.0	0″.7 ±	1*n*	H
1832.66	80.3	1.06	3*n*	Σ
1844.90	82.7	1.10	1*n*	Ma
1869.03	90.4	1.01	4*n*	Δ
1885.67	95.3	0.86	5*n*	Hl
1896.55	98.6	0.90	3*n*	Lv
1897.55	98.5	0.90	2*n*	Gla
1900.26	99.3	0.88	3*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)... H (**V**)... Flm ... Δ (**II**)... Do (2303)... Hl (**I, II**)... Lv (*A. J.* 407)...Glasenapp (**V**)...Greenwich Obsy. (*Mon. Not.* **LX**, 511)... Doolittle (*Pub. Flower Obsy.* **I**)...]

9458. *ε Sagittae.* **♅ VI. 26.** (= **♅ VI. 63** = **♅ N. 83** = ***σ* 628** = **S 721** = **OΣ̄ (App) 185.**) In ♅ VI. 63 the angle is reversed. ♅ N. 83 is given as 3^m *p* and 11′ *s*. There is no pair there, and it is certainly identical with this. The proper motion of the large star is given 0″.013 in 297°.5 (Auwers). 31 51

1840.69	81°.2	91″.38	1*n*	OΣ	5.7...7.7
1875.61	81.3	90.68	4*n*	Δ	5.6...7.9
1901.46	81.4	89.82	3*n*	β	

[OΣ (**X**)... Δ (**I**)...Big (*Bul. Ast.* **XII**, 299)...Franz (3264)...β^6...]

9459. **OΣ 377.** No change in C, and very little, if any, in AB. 31 53

A and B

1842.68	51°.2	0″.88	2*n*	OΣ
1843.65	53.3	0.77	2*n*	Ma
1853.20	45.0	0.86	2*n*	OΣ
1868.63	38.4	0.85	4*n*	Δ
1871.07	44.9	0.87	5*n*	Du

1884.57	39°8	1″07	2*n*	Per
1898.56	40.1	0.95	3*n*	Hu
1903.56	39.4	0.86	2*n*	Do

AB and C

1868.62	154°5	25″14	4*n*	Δ
1898.56	154.6	25.46	3*n*	Hu
1902.56	154.4	25.44	2*n*	Do

[Ma (**XI**)... OΣ (**IX, X**)... Δ (**I**) ... Flm ... Du ... Do (2322, 3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Per...Per (2685)...En (2742)...HΣ (**XII**)...Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...Do (3931)...]

$31^{m}\ 55^{s}$ **9461.** **OΣ (App) 187.** The later measures are:

AB	1886.78	286°9	63″64	4*n*	Franz
	1905.61	287.1	64.27	2*n*	β
AC	1905.61	255.0	129.06	2*n*	β

[Δ (**I**)...Franz (3080)...β^{6}...]

$31\ 58$ **9462.** **H 1421.** In the field with OΣ 377. In DM 9.2 m.

1900.46	231°3	14″65	1*n*	Hu	8.8...9.2

[Hu (*Bul. L. O.* No. 44)...]

$32\ 5$ **9463.** **Σ 2554.** Unchanged.

1866.47	196°5	18″58	3*n*	Δ
1903.62	195.4	17.97	2*n*	Espin

[H (**V**)... *Gr. Obsns.* 1840... Ma (*F. S.* **I**)... Δ (**II**)... Glasenapp (**IV**)... Espin (*Mon. Not.* **LXIV**, 677)...]

(See p. 1081)

$32\ 8$ **9464.** **Σ 2545.** (= **H I. 13 = S 720.**) No material change.

1866.85	318°2	3″53	4*n*	Δ
1886.70	316.4	3.62	3*n*	Hl
1890.59	317.4	3.56	4*n*	Giacomelli
1903.43	321.4	3.65	3*n*	β

H noted a distant star 11 m, not measured by Σ:

1886.70	168°8	27″98	3*n*	Hl
1903.43	168.1	27.35	3*n*	β

[Ma (*F. S.* **I**) ... Ma (**XI**) ... H^{1}... Bp ... Da^{4} ... Da (*Mon. Not.* **XXIII**, 34) ... Hunt (*Mon. Not.* **XXXII**, 90)...Mh...Ra (**XXIV**)...J^{2}...Se...Hd...Flm... Perry (*Eng. Mech.* **XXXVI**, 65)...Ferr... Kn ...Gl ...**WS**...WS^{2}...Δ (1125) ... Δ (**I, II**) ... Do (2199, 2316)(*Trans. R. I. Acad.* **XXIX**, Part 13) ... Pt... Cin^{4}... Cin^{5} ... Cin^{6}... Lv^{1}... T (2898) ... Giacomelli (**III**) ... Hl (**II**) ... Hl (*Wash. Obsns.* 1886).... β (*Mon. Not.* **XXXIV**, 378).... Glasenapp (**I**).... Pt (*A. J.* 397) ... Lunt (*Mon. Not.* **LXI**, 607) ... *Annals Toulouse Obsy.* **III** ... Scott (*Mon. Not.* **LXIV**, 52)...β^{6}...]

$32\ 13$ **9466.** **β 249.** Discovered with the 6-inch. Little or no change. A distant companion in 45°.

1876.61	149°1	1″55	1*n*	OΣ
1879.17	141.5	1.20	1*n*	Sp
1884.25	137.8	1.76	3*n*	HΣ
1891.72	137.4	1.23	3*n*	β
1902.66	138.6	1.23	7*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)... β (3114)(*Pub. L. O.* **II**)... Δ (**I**)... OΣ (**X**) ...Sp (**II**)...HΣ (**XII**) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

9467. **Σ 2551.** Fixed. $32^{m}\ 16^{s}$

1869.90	42°9	6″59	4*n*	Δ
1894.56	43.0	6.58	2*n*	Gla

There is a distant 11 m star:

1877.81	319°8	44″2	1*n*	Δ
1894.63	318.6	44.95	2*n*	Gla

[Ma (*F. S.* **I**) ... Ma (**XI, XIII**) ... H (**V**) ... Se ... Δ (**II**) ... Glasenapp (**III**) ... *Annals Toulouse Obsy.* **III**...]

9468. **S 722.** (= σ 627.) Fixed. H^{1} reversed angle; $32\ 18$ magnitudes, 6...6+. "Duplex" in O. Arg. S., 8 m.

1879.41	235°1	10″03	1*n*	Cin	7.0...8.0
1887.78	235.1	10.11	3*n*	T	7.0...8.0
1905.67	235.5	9.91	2*n*	β	

[H^{1}... Cin^{5}... Wilson (Cin^{10})...T (2899)...β^{6}...]

9469. **Σ 2547.** Fixed. A distant star in J^{2}, 145°0 : 48″ ± $32\ 21$ (1845.80).

1868.25	331°3	20″72	4*n*	Δ
1890.54	331.0	20.81	2*n*	Gla

[Ma (*F. S.* **II**)... H^{1}... Mh ... J^{2} ... Perry (*Eng. Mech.* **XXXVI**, 65)...WS^{2}... Δ (**II**)...Cin^{4}...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...]

9470. 9 *Cygni.* **H 1423.** The proper motion is small, $32\ 22$ 0″021 in 158°5 (Auwers). The only later position is:

1900.58	128°6	21″00	2*n*	β^{5}	6.5...11.2

9471. **A 107.** No other measures. $32\ 30$

[A (3668)(*Bul. L. O.* No. 11)...]

9473. **OΣ 378.** Without change. $32\ 30$

1867.51	287°4	1″24	4*n*	Δ
1898.56	287.5	1.36	3*n*	Hu
1901.61	288.3	1.30	3*n*	Doo

[Ma (**XI**)...OΣ (**IX**)...Da^{3}... Δ (**I**)... Sk^{2}... Big... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9474. **Σ 2552.** Unchanged. $32\ 37$

1866.68	196°5	5″25	3*n*	Δ
1892.84	197.6	5.13	2*n*	Gla

[Ma (*F. S.* **I**).... Ma (**XI**).... H (**V**).... Se.... Δ (**II**).... Ho (2978).... Glasenapp (**II**)....]

9475. 53 *Sagittarii.* **See 389.** No other measures. The $32\ 37$ proper motion is 0″038 in 189°0 (Hedrick).

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

9476. **A 370.** A 5″ pair of small stars *nf* A. $32\ 39$

[A (*Bul. L. O.* No. 29)...]

$32^m\ 45^s$ **9478.** **A** 164. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

32 47 **9480.** **See** 390. Distance less:

1899.72	86°8	14″34	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

33 3 **9481.** **β** 144. Discovered with the 6-inch. The other measures are:

1883.76	350°9	6″48	6*n*	En
1888.77	351.0	6.57	2*n*	Maw
1903.09	351.2	6.59	3*n*	Doo

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59) ... β^3 ... Δ (**I**) ... **En** (2678) ... **Maw** (**I**) ... Doolittle (*Pub. Flower Obsy.* **II**)...]

33 6 **9483.** **Ho** 109. (= **Hd** 154.) Change uncertain. (See No. 9497).

1894.71	112°2	11″05	2*n*	Ho
1904.71	113.9	11.43	3*n*	Doo

[Ho (2779, 3558)...]

33 6 **9484.** **H** **V.** 51. After a very careful search for this pair, and a thorough examination of the region about this place, I am satisfied that it is identical with H N. 84 (No. 9498). The description by H, particularly as to the colors, *red: blue*, agrees perfectly with the last-named pair.

In the course of this search two pairs were measured which are not given in Part I. The first is DM (16°) 3925, the place of which is:

R. A. = $19^h\ 32^m\ 46^s$
Decl. = 16° 58′

There is a faint star between the components.

1904.50	131°0	37″10	2*n*	β^6	7.0...10.6

The other pair is DM (16°) 3928:

R. A. = $19^h\ 33^m\ 4^s$
Decl. = 16° 59′

1904.50	333°3	12″45	2*n*	β^6	8.1...11.7

33 13 **9485.** *θ Cygni.* **β** 1131. The close star was discovered with the 36-inch. It is a difficult object, and beyond the reach of all but large refractors. The proper motion is given:

Auwers	0″244 in 351°8
Paris	0.241 in 354.5

It is evident from the measures that the faint companion is moving with it, and we certainly have a most interesting physical system. So far the relative change is small. The change in C is accounted for by the proper motion of A, which is nearly in the opposite direction, and therefore principally affects the distance. The following are all the measures:

A and B

1889.37	43°9	3″62	3*n*	β
1892.38	47.0	3.79	1*n*	β
1898.46	49.2	3.37	1*n*	β
1898.63	46.9	3.71	3*n*	A

A and C

1852.69	186°1	29″90	1*n*	OΣ
1882.62	183.8	37.27	1*n*	OΣ
1898.45	182.8	42.16	3*n*	β
1899.55	183.0	42.30	1*n*	β
1905.38	182.6	43.90	2*n*	β

The measures of AC give 0″272 in 355°3 for the annual motion of A.

[β (**XVI**) ... β (2912, 2956, 3142)(*Pub. L. O.* **II**) ... **A** (3585) ... **OΣ** (**X**, p. 105) ... β^6...]

9486. *σ Aquilae.* **H** 2886. "An immense number of stars in the field." In another observation, B is called 15 m. The proper motion of *σ Aquilae* is 0″027 in 278°5 (Auwers). This is the only measure: $33^m\ 15^s$

1903.53	327°8	47″71	3*n*	β^6	...11.8

9487. **Σ** 2555. Without change. 33 19

1868.07	276°6	1″75	4*n*	Δ
1905.75	280.1	1.58	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Se... Δ (**II**)...Glasenapp (**V**)...β^6...

9489. **OΣ** 379 *rej.* Rejected in second edition of *Poulkowa Catalogue.* The observation in Ma (XI), 145°9 : 44″± (1843.66) 1*n*, evidently belongs to some other star. Without change. 33 30

1898.60	86°8	24″75	2*n*	Hu
1900.98	86.5	24.93	2*n*	β

[Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^5...]

9490. **A** 165. No other measures. 33 31

[A (3741)(*Bul. L. O.* No. 3)...]

9491. **Ho** 110. Without change. 33 35

1904.59	77°2	2″17	3*n*	Doo

[Ho (2779, 3234)...]

9493. **H** 893. The only later measures are from *A. G. Leipzig*, p. 250. 33 46

1894.81	193°4	8″58	1*n*	9.2...9.5

9495. **H** 1427. "In *s* part of a fine cluster of perhaps 100 stars." 33 51

33^m 52^s **9496.** 54 *Sagittarii.* **H** 599. Measures from H (V); AC *fine yellow: pale blue.* In H (IV) the small star is called 18 m. No early measures of B. C is SD (16°) 5400. The proper motion of 54 *Sagittaii* is 0″054 in 136°2 (Auwers). There is an error in reducing my angle of AB in 1878; it should be as given here.

AB	1878.70	272°6	35″76	1*n*	β	5...11.5
	1903.52	274.0	37.95	3*n*	β	...11.8
AC	1878.70	41.7	45.57	1*n*	β	... 9.0
	1903.52	42.0	45.65	3*n*	β	... 8.6

[H (**IV, V**)...J^{2}...Ra (**XXI**)...Cin^{5}...β^{1}...Glasenapp (**I**)...β^{6}...]

34 ± **9497.** **Hd** 154. See No. 9483.

34 0 **9498.** **H N.** 84. (= **H II.** 32.) Unchanged. The only measures since 1796 are the following

1840.22	302°2	28″61	2*n*	OΣ	6.5...8.5
1900.51	301.3	28.51	2*n*	β	6.5...8.6

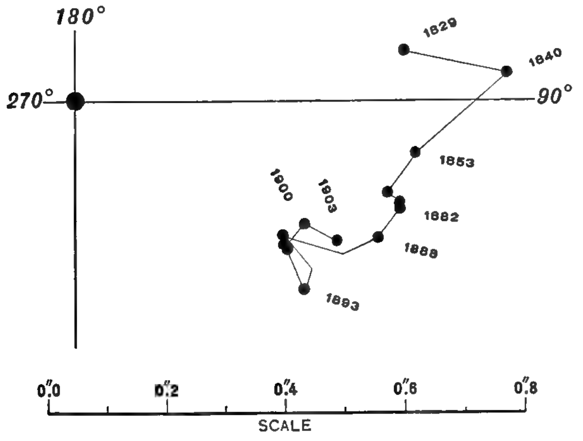
[OΣ (**X**)..β^{5}...]

34 5 **9499.** **β** 1287. A close pair of small stars found with the 40-inch. This star is not given in SD. It is 245″5 from 54 *Sagittaii* in the direction of 111°7 (1899.44).

1903.55	144°0	1″02	2*n*	β	10.3...10.4

[β (*Pub. Y. O.* **I**)...β^{6}...]

34 17 **9500.** **Σ** 2556. Probably binary, but the measures are too discordant to show anything beyond change in the position-angle.



Σ 2556.

1829.83	188°4	0″56	3*n*	Σ
1840.84	183.4	0.73	1*n*	OΣ
1853.68	171.0	0.58	2*n*	OΣ
1864.91	167.7	Obl.	5*n*	Δ
1872.64	163.4	0.55	1*n*	OΣ
1876.24	162.3	0.58	2*n*	Δ
1882.15	161.8	0.58	6*n*	Hl
1888.26	155.6	0.56	3*n*	HΣ
1892.96	147°1	0″42	3*n*	Ho
1893.69	140.5	0.5±	2*n*	Gla
1896.22	144.8	0.44	5*n*	Lewis
1899.56	145.2	0.43	4*n*	Bowyer
1900.53	151.8	0.44	4*n*	A
1903.86	151.6	0.50	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**IX, X, XI**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Du... OΣ (**IX**)...Δ (1573)...Δ (**II**)...WS...Sk...Sk^{3}...Big...Newcomb (*Wash. Obsns.* 1874)...Hl (*Wash. Obsns.* 1884) ..Hl (**I, II**)...Sp (2133)...Sp (**II**) ...UL...Per...Per (2559, 2749)...En (2677)...Ho (3234, 3558)...Glasenapp (**III**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 512; **LXI**, 486; **LXII**, 383)...Do (3680)...A (*Bul. L. O.* No. 11)...HΣ (**XII**)...Biesbroeck...]

9501. **β** 977. Discovered with the 18½-inch. 34^m 19^s

1891.63	56°7	4″14	2*n*	β
1899.34	53.8	3.95	3*n*	Doo

[β (**XIII**)...β^{3}...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9502. **See** 391. Later measures: 34 25

1899.69	37°9	6″06	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9503. **H** 894. The measures by Δ (1573) credited to Σ 2557 belong to this pair. 34 32

1868.12	114°8	7″97	4*n*	Δ	10.1...10.6

[Δ (1573, 1736)...Δ (**I**)...H (**V**)...] (See p. 1081)

9504. 45 *Aquilae.* **H** 2888. "A large star in a constellation of at least a dozen small ones within 2′ distance; that taken forms with the large star a good representation of the *Georgium Sidus* and one of its satellites. It is a fair comparison in point of light." Not seen once with 6-inch (1875). The principal star has a small proper motion, 0″014 in 328°0 (Auwers). The only measure of the Herschel companion is: 34 33

1900.49	354°8	42″56	2*n*	β^{5}	6.5...13.7

9506. **H** 1428. (= **Σ** 2559 *rej.*) The small star D not in Σ. The large star is given a proper motion of 0″159 in 7°4 (*Greenwich 10-Year Catalogue*). The only measures are these: 34 37

AB	1905.67	257°5	24″70	2*n*	β^{6}	7.7...10.6
AC	1905.67	258.7	55.87	2*n*	β^{6}	...10.6
CD	1905.64	273.8	10.46	1*n*	β^{6}	...13.0

9507. **Σ** 2557. (AC = **β** 54.) The small star C was added with the 6-inch. There is no change in B. The measures in Δ (1536) belong to H 2888, same R. A., and exactly 10° *s.* 34 49

A and B

1843.77	105°7	11″17	2*n*	Ma
1868.32	104.4	11.16	3*n*	Δ
1876.61	104.2	11.22	1*n*	OΣ
1879.45	103.6	10.94	2*n*	β
1899.71	103.4	11.38	4*n*	Doo

A and C

1876.61	303°5	21″86	1*n*	OΣ
1879.45	302.4	21.03	2*n*	β
1899.71	303.3	21.78	4*n*	Doo

[β (I) . . . β (*Mon. Not.* **XXXIII**, 351) . . . β^1 . . . β^3. . . Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Δ (**II**) . . . Δ (1573, 1736) . . . OΣ (**X**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

35$^{\text{m}}$ ±$^{\text{s}}$ **9508.** **O. Stone** 47. From Cin^5. I could not find anything in this vicinity to correspond with the description, though there are many faint pairs. One near this place is 64°7 : 7″54.

[β^5. . .]

35 4 **9509.** **Σ** 2571. (= **Sh** 302.) Fixed.

1868.09	21°8	11″26	4*n*	Δ
1899.75	20.7	11.35	3*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H^1. . . Wr. . . OΣ (**IX, X**) . . . Δ (1194) . . . Δ (**I**, pp. 91, 407, **II**) . . . *Gr. Obsns.* 1840 . . . Ra (**XXIII**) . . . Pt . . . En (2662) . . . Hl (I) . . . Seagrave (*Sid. Mess.* **II**, 274) . . . Cin^5. . . de Ball (3017) . . . Glasenapp (**III**) . . .]

35 5 **9510.** **A** 166. No other measures.

[A (3741)(*Bul. L. O.* No. 3) . . .]

35 12 **9511.** **A** 272. No other measures.

[A (3784)(*Bul. L. O.* No. 16) . . .]

35 14 **9512.** **Ho** 111. A 12 m star, 171° : 24″. The only later observation is the angle by Ho, 357°9 (1893.25) 3*n*.

[Ho (2779, 3558) . . .]

(See p. 1081)

35 26 **9514.** **Σ** 2558 *rej.* The only measure is this:

1905.58	300°0	28″98	2*n*	β^6	8.2 . . . 10.7

35 34 **9516.** **Σ** 2560 *rej.* Measures by β^5. In Struve, Cl. IV, 6 . . . 10. No other measures.

35 38 **9518** **Kustner** 2. Discovered by Kustner with the Berlin Meridian Circle. The proper motion is 0″127 in 230°5 (Kustner). Change in distance?

1897.71	262°0	1″30	3*n*	A
1902.06	270.8	1.22	2*n*	β
1904.04	268.7	1.05	3*n*	Biesbroeck

[Kustner (2756, 3821) . . . β (2930)(*Pub. L. O.* **II**) . . . A (*A. J.* 429) . . . Biesbroeck . . . β^6. . .]

35 39 **9519.** 55 *Sagittarii.* **β** 1288. At Mt. Hamilton on June 7, 1889, I examined this star with the 12-inch, and recorded it as a close equal pair, with magnitudes 5½ and 5½, and "distance less than 0″2." The angle was measured with the highest power of that instrument, giving 340°7. This observation was overlooked, and the star not subsequently examined with the 12 or 36-inch. Aitken looked at it several times in 1900 and 1901, and again in 1905, but could detect no certain elongation with the 36-inch.

[β (*Pub. Y. O.* **I**) . . . A (*Bul. L. O.* No. 11) . . .]

9520. **β** 656. Discovered with the 18½-inch. The proper motion in *A. G. Harvard* is 0″046 in 90°. 35$^{\text{m}}$ 48$^{\text{s}}$

1878.33	259°1	0″51	3*n*	Δ
1884.57	256.3	0.73	2*n*	HΣ
1890.47	257.9	0.69	5*n*	Sp
1898.48	256.0	0.78	5*n*	Doo

[β (**X**) . . . β^1. . . Δ (**I**) . . . Sp (**III**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . . HΣ (**XII**) . . .]

9521. **Σ** 2564. Distance and angle decreasing; probably proper motion. All the measures are given. 35 49

1832.28	184°0	10″78	2*n*	Σ
1844.90	184.0	10.84	1*n*	Ma
1868.62	178.3	10.07	4*n*	Δ
1878.40	175.1	10.04	1*n*	β
1896.51	170.6	9.88	2*n*	Lv
1896.52	170.3	9.89	4*n*	Soulé
1905.49	171.0	9.62	3*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**IV**) . . . Flm . . . Δ (1736) . . . Δ (**II**) . . . β^1. . . Lv (*A. J.* 407) . . . Soulé (*A. J.* 410) . . . β^6 . . .]

9522. **Σ** 2561 *rej.* From H (IV). The following are all the measures: 35 57

1879.39	312°7	17″27	1*n*	Cin^5	8.0 . . . 10.5
1905.32	310.5	17.13	2*n*	β^6	7.9 . . . 10.6

9523. **Ho** 112. No change. 36 9

1904.55	259°4	2″41	3*n*	Doo

[Ho (2779, 3234) . . .]

9524. **β** 145. Discovered with the 6-inch. Apparently fixed. 36 31

A and B

1878.63	258°1	0″93	2*n*	OΣ
1885.53	264.9	1.05	1*n*	HΣ
1888.78	266.4	0.73	4*n*	Sp
1893.50	266.1	0.87	3*n*	Wilson
1899.70	266.2	0.83	3*n*	Doo

AB and C

1879.66	24°5	9″62	2*n*	OΣ
1885.53	28.5	9.08	1*n*	HΣ
1893.50	28.7	9.30	2*n*	Wilson
1899.70	28.8	9.03	3*n*	Doo

AB and D

1876.70	155°9	27″39	1*n*	OΣ
1885.53	156.9	26.80	1*n*	HΣ
1893.50	157.6	26.76	2*n*	Wilson
1899.70	156.2	27.08	3*n*	Doo

[β (**III**) . . . β (*Mon. Not.* **XXXIV**, 59) . . . β^3. . . Δ (I) . . . OΣ (**X**) . . . Wilson ( ) . . . HΣ (**XII**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

$36^{m}\ 33^{s}$ **9525.** **Σ 45, App. I.** *Aquilae* 151. (= **Sh** 298.) Fixed.

1869.03	146°6	96″86	5*n*	Δ
1905.62	146.3	96.63	2*n*	β

[Se^{1}.... En.... Ra (**XXV, XXXVIII**).... Maiebckato (*Obsns.* 1892).... Δ (**II**).... Je (2341)... Glasenapp (**I, III**)... β^{6}...]

36 38 **9527.** **Howe** 50. From Cin^{5}. No other measures.
(See p. 1081)

36 46 **9528.** **H** 895. C is DM (0°) 4284. The only measures are with the 40-inch, which shows a new companion to C.

AB	1901.47	207°7	14″18	3*n*	β^{5}	8.7...10.5
AC	1901.47	16.8	28.53	3*n*	β^{5}	... 9.1
CD	1901.47	124.2	4.59	2*n*	β^{5}	...13.7

36 50 **9530.** **A** 167. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

36 55 **9531.** χ *Aquilae.* **OΣ** 380. There does not appear to be any material change in the position or distance of the small star since the measures of OΣ.

In 1842, and at intervals thereafter, OΣ saw and measured a third star 10-11 m, about 1½″ from A. It was also seen by other observers with more or less certainty. On the other hand, the same observers failed to see it at other times, and it has never been seen by any of the modern large refractors. I have looked for it in the last thirty years many times with apertures up to 36 inches, and have never seen the least trace of any such star. It is probable, therefore, that it does not exist, and that the observers mentioned were deceived by some optical illusion.

The proper motion of χ *Aquilae* is 0″031 in 302°7 (Auwers). The following are some of the later measures:

1851.98	68°9	0″3±	4*n*	Ma
1877.72	74.6	0.64	3*n*	β
1882.16	76.9	0.55	6*n*	Hl
1883.42	64.7	0.36	9*n*	En
1887.78	78.9	0.45	2*n*	Sp
1898.68	74.2	0.65	3*n*	Hu
1903.83	73.2	0.58	1*n*	Biesbroeck

[Ma (**XI, XIII**).... OΣ (**IX**).... Se.... Da^{3}.... Flm.... Δ (**I**).... Newcomb (*Wash. Obsns.* 1874) ... Hl (*Wash. Obsns.* 1884) ... Hl (**I, II**) ... Per... Per (2685)... En (2678)... T (2991) ... Sp (**II, II** App.) ... β^{1}... β (2957)(*Pub. L. O.* **II**)... Big (*Bul. Ast.* **XII**, 299).... Solá (3529, 3679).... Do (3466, 3680).... Hu (*Pub. L. O.* **V**)... HΣ (**XII**)... Biesbroeck...]

36 57 **9532.** **See** 393. In 1899, with very favorable conditions, Cogshall was unable to see any elongation with a power of 1000.

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

36 58 **9533.** **Σ** 2562. Fixed.

1868.07	252°3	26″92	4*n*	Δ
1895.68	251.6	27.32	4*n*	Coleman

[Ma (*F. S.* **I**).... Ma (**XI**).... H (**V, VIII**).... Ferguson (*Wash. Obsns.* 1863).... Ra (**XXIV**) ... Δ (1209) ... Δ (**I, II**) ... Glasenapp (**I, III**)... Coleman (*Mem. R. A. S.* **LIII**)... *Annals Toulouse Obsy.* **III**...]

9535. **OΣ** 382. Fixed. $37^{m}\ 0^{s}$

1868.24	353°5	Obl.	5*n*	Δ
1878.53	355.3	0″45	1*n*	β
1898.51	349.5	0.43	3*n*	Hu

[Ma (**XI, XIII**)... OΣ (**IX, X**)... Se ... Newcomb (*Wash. Obsns.* 1874)... Δ (**I**)... Per... Per (2685)... β^{1}... Hu (*Pub. L. O.* **V**)...]

9537. **Ho** 579. Unchanged. 37 2

AB	1904.44	309°2	2″35	3*n*	Doo
AC	1904.49	155.3	61.37	2*n*	Doo

[Ho (3557)...]

9538. **Σ** 2563. (= H I. 65.) Fixed. The third star, Cl. V-VI, mentioned by H, is in the *np* quadrant, and about 9 m. 37 5

AB	1866.68	284°9	5″97	3*n*	Δ
	1905.60	285.8	6.01	1*n*	β
AC	1905.60	322.3	83.38	1*n*	β

C has two companions, the nearest 11.5 m, 104°5 : 8″62 (1905.60).

[Ma (*F. S.* **I**)... Ma (**X, XI**)... H^{1}... Se... Δ (**II**)... Glasenapp (**III**)... β^{6}...]

9540. **OΣ** 381 *rej.* Rejected in second edition of the *Poulkowa Catalogue.* Companion not visible to Δ in 1865; easy with 6-inch in 1876. No change shown by the later measures. 37 23

1899.50	5°9	15″47	3*n*	Hu	8.0...12.0
1900.51	6.0	15.13	3*n*	β	7.2...11.7

[Ma (**XI, XIII**)... Δ (**I**, p. 229)... Hu (*Pub. L. O.* **V**)... β^{5}...]

9543. **Ho** 113. Without change. 37 44

1904.70	12°4	3″74	3*n*	Doo

[Ho (2779, 3558)...]

9545. **Σ** 2575. No material change. 37 44

1868.04	33°9	7″29	4*n*	Δ
1905.69	36.1	7.54	2*n*	β

[Ma (**XI**)... Ma (*F. S.* **I**)... Δ (**II**)... β^{6}...]

9547. **Collins.** Observed for β 827, but it is a new pair in the field *n*. 37 46

1898.64	248°6	1″10	5*n*	Doo	8.1...8.8
1899.71	249.3	1.37	3*n*	Hu	8.5...8.8

[Collins (*Proc. Haverford Coll. Obsy.* 1891) ... Doolittle (*Pub. Flower Obsy.* **I**) Hu (*Bul. L. O.* No. 44)...]

9548. **Weisse** 34. Noted "duplex" in Weisse. It is not double, although there are several stars in the field. The 7½ m star *nf* has a 25″ companion *p*. In the DM the Weisse star is (4°) 4205, and a 9.3 m star (No. 4208) is 26^{s}5 *f* and 2′2 *n*. The difference in R. A. is now much less. 37 56

[β^{5}...]

38m 7s **9551.** **β 827.** Discovered with the 15½-inch at the Washburn Observatory.

The later measures are:

1888.05	269°9	0″98	3*n*	Com
1893.76	264.5	1.02	3*n*	Wilson
1899.70	267.2	0.94	3*n*	Hu
1900.55	266.0	0.89	2*n*	Doo

The measures credited to this star by Collins (*Proc. Haverford Coll. Obsy.* 1891) belong to a new pair 15′ *n* of β 827. It is somewhat similar to this in angle and magnitudes (No. 9547).

[β (**XII**) . . . β2 . . . Com (**VI**) . . . Wilson ( ) . . . Hu (*Bul. L. O.* No. 44) . . . Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**) . . .]

38 11 **9552.** **β 1132.** Discovered with the 36-inch. Change uncertain.

1897.68	227°1	0″47	2*n*	Lewis
1898.82	225.2	0.42	2*n*	A
1899.66	221.5	0.43	5*n*	Lewis

[β (**XVI**) . . . . β (2956)(*Pub. L. O.* **II**) . . . . Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486) . . . A (3585) . . .]

38 20 **9554.** **Σ 2573.** Unchanged.

1866.64	28°4	18″13	3*n*	Δ
1903.60	27.2	18.13	1*n*	Espin

[Ma (*F. S.* **II**) . . . Ma (**XIII**) . . . Δ (**II**) . . . Glasenapp (III, IV) . . . *Annals Toulouse Obsy.* **III** . . . Espin (*Mon. Not.* **LXIV**, 677) . . .]

38 29 **9556.** **Σ 2567.** (= **H IV. 132.**) Unchanged. The distance in H is too large.

1868.04	314°5	18″04	4*n*	Δ
1905.60	314.1	18.12	1*n*	β

[Ma (*F. S.* **II**) . . . Ma (**XI, XIII, XV**) . . . Δ (**II**) . . . Glasenapp (**III**) . . . β6 . . .]

38 35 **9557.** **Σ 2566** *rej.* From H (V); *orange : bluish.* Apparently fixed.

1879.55	234°5	25″04	2*n*	Cin	7.5 . . . 10.5
1905.37	234.3	25.27	2*n*	β	8.0 . . . 10.5

[Ferguson (*Wash. Obsns.* 1863) . . . Cin5 . . . β6 . . .]

38 35 **9558.** **Σ 2565.** Unchanged.

1867.40	38°6	5″08	3*n*	Δ
1892.64	37.7	5.17	2*n*	T

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . Se . . . Δ (**II**) . . . T (3185) . . . *Annals Toulouse Obsy.* **III** . . .]

38 36 **9559.** **OΣ (App) 188.** There is a 13 m star almost exactly midway between the large stars, from A 28″73, and from B 30″48 (1905.79).

1905.79	121°6	59″06	1*n*	β

[Δ (**I**) . . . Franz (3080) . . . β6 . . .]

9560. 16 *Cygni.* **Σ 46, App. I.** (= **H V. 46 = Sh 299 = OΣ (App) 189.**) The proper motions are: 38m 38s

A = 0″228 in 229°2 Auwers
0.263 in 228.8 Paris
0.222 in 227.9 Porter
B = 0.199 in 220.2 Auwers
0.161 in 228.5 *A. G. Harvard*

This seems to be a system of the 61 *Cygni* type.

1832.59	136°2	37″31	5*n*	Σ
1855.54	135.8	37.65	4*n*	OΣ
1868.26	135.4	37.76	5*n*	Δ
1877.65	135.5	37.97	10*n*	Je
1886.60	135.1	38.14	3*n*	Hl
1905.32	134.8	38.18	3*n*	β

[Se1 . . . Ra (**XXVI, XXVIII**) . . . Δ (**II**) . . . Goldney (2257) . . . Maiebckato (*Obsns.* 1892) . . . OΣ (**X**) . . Franz (2649) . . . Je (2343) . . . Engelhardt (**II**) . . . Hl (**II**) . . . Hl (*Wash. Obsns.* 1886) . . . Glasenapp (**III**) . . . β6 . . .]

9561. **H 5144.** In Cord. DM 9.3 m. 38 39

1880.10	9°4	10″32	2*n*	Cin	8.5 . . . 9.5
1897.67	10.3	9.76	1*n*	See	8.1 . . . 9.1

[Cin5 . . . Cin6 . . . See (3496) . . .]

9562. **β 657.** Discovered with the 18½-inch. The change, if any, is slow. 38 40

1878.78	144°4	0″90	1*n*	β
1892.71	328.2	0.80	2*n*	Ho
1898.65	147.7	0.84	3*n*	A
1900.51	147.2	0.99	5*n*	Doo

[β (**X**) . . . . β1 . . . . Δ (**I**) . . . . Ho (3234) . . . . A (3585) . . . . Doolittle (*Pub. Flower Obsy.* **I, II**) . . . .]

9564. **A. G. 235.** Double in *A. G. Leiden.* Measures by β6. 38 45

1904.81	168°0	11″11	2*n*	Es	8.5 . . . 9.5

9565. **OΣ 383.** No certain change. 38 52

1869.01	26°3	0″83	5*n*	Δ
1898.03	21.4	0.85	6*n*	Hu
1902.17	24.4	0.95	3*n*	Doo
1903.54	23.0	0.95	2*n*	Do

Doberck measures a distant star, 98°9 : 45″52 (1903.54) 1*n*.

[Ma (**XI**) . . . OΣ (**IX**) . . . Da3 . . . Se . . . Flm . . . Newcomb (*Wash. Obsns.* 1874) . . . Δ (**I**) . . . Big (*Bul. Ast.* **XII**, 299) . . . Hu (*A. J.* 397)(*Pub. L. O.* **V**) . . . Do (3931) . . . Doolittle (*Pub. Flower Obsy.* **II**) . . .]

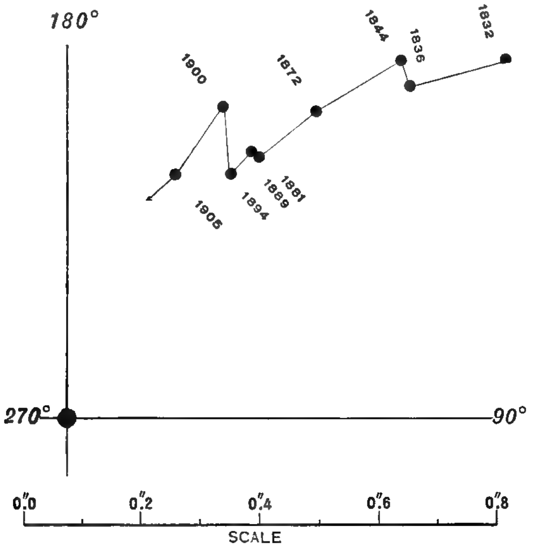
9568. **A. G. 236.** Double in *A. G. Leiden.* Measures by β6. There is a 12 m star, 324° : 12″. 39 0

9569. **β 658.** Discovered with the 18½-inch. Relative change is not very certain, but the components evidently have the same movement in space. The proper motion of the principal star is 0″062 in the direction of 195°0 (Auwers), and this is therefore probably a physical system. 39 1

1882.62	295°9	0″63	1*n*	OΣ
1889.16	290.8	0.56	9*n*	HΣ
1889.56	299.9	0.50	3*n*	β
1889.86	297.4	0.45±	3*n*	Sp
1897.63	291.1	0.50	3*n*	Lewis
1900.46	301.1	0.58	5*n*	Doo

[β (**X**)... β1... β (2957) (*Pub. L. O.* **II**)... OΣ (**X**)... Perry (*Eng. Mech.* **XXXVI**, 65)... Sp (**III**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486; **LXII**, 383; **LXVI**, 29)... HΣ (**XII**)... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

39m 5s **9570.** **Σ 2574.** Slow direct motion, and probably binary, although so far the motion is practically rectilinear.



Σ 2574.

1832.23	129°4	0″96	3*n*	Σ
1836.90	134.3	0.81	2*n*	Σ
1844.33	137.0	0.83	3*n*	OΣ
1872.14	141.0	0.67	8*n*	Δ
1881.62	143.7	0.55	3*n*	β
1889.65	145.3	0.55	3*n*	Hl
1894.63	146.4	0.5±	2*n*	Gla
1900.49	153.7	0.59	5*n*	Doo
1905.47	156.2	0.45	1*n*	A

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Se... Se (*Comp. Rend.* **XLVIII**, 375)... OΣ (**IX**)... Δ (1736)... Δ (**II**)... Flm... Do (2303)... β1... β4... Hl (**II**)... Glasenapp (**III**).... Bryant (*Mon. Not.* **LX**, 512).... Doolittle (*Pub. Flower Obsy.* **I**) ... Biesbroeck...]

39 9 **9571.** **See 394.** Later measures are:

1899.68	287°7	0″50	3*n*	Cg	7.7...9.2

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

39 14 **9572.** **H 2894.** "The chief of 16 or 18 stars." The later observations are:

1879.53	319°6	9″50	1*n*	Cin5	9.0...11.5
1905.79	320.5	10.11	1*n*	β6	9.2...11.5

39 15 **9573.** **H 2893.** Nothing later but Cin5, 56°2 : 10.0...11.0 (1879.49) 1*n*.

9574. **A. G. Clark 10.** (AC = **Σ 2570** = **H I. 91** = **S 723.**) 39m 15s
No change in C. The close pair was discovered by Alvan G. Clark in 1875 with the 12-inch now at the Lick Observatory. The following are all the measures of AB:

A and B

1878.35	145°5	0″29	3*n*	β	
1880.22	147.6	0.29	3*n*	β	
1884.46	146.7	0.26	4*n*	Young	
1890.61	145.1	0.24	3*n*	β	8.3...8.4
1901.06	142.4	0.26	2*n*	A	7.7...7.8
1905.55	147.6	0.29	2*n*	A	

AB and C

1866.12	277°0	4″14	4*n*	Δ
1890.61	277.6	4.30	3*n*	β
1905.57	277.6	4.00	1*n*	A

[Ma(*F. S.* **I**)... Ma (**XI**)... H (**IV**)... Mh... Se... WS... WS2... Δ (**II**)... T (3185) ... β1... β3... β (3048)(*Pub. L. O.* **II**)(*Am. Jour. Sci.* April 1879)... Glasenapp (**IV**)... A (*Bul. L. O.* No. 11)... *Annals Toulouse Obsy.* **III**... Thiele (3837)...]

9576. **Ho 453.** Later measures are: 39 20

AB	1904.71	49°1	15″40	3*n*	Doo
AC	1904.71	135.5	34.28	3*n*	Doo

[Ho (3234)...]

9577. **Σ 2569.** No change. 39 22

1866.33	358°3	2″19	3*n*	Δ
1887.10	358.6	2.12	3*n*	HΣ
1905.60	359.7	2.11	1*n*	β

[Ma (*F. S.* **I**)... Ma (**X**)... En (1674)... Se... Δ (**II**)... Cin5... Glasenapp (**III**)... HΣ (**XII**)... β6...]

9580. **β 467.** Discovered with the 6-inch. Probably 39 24
without change.

1886.72	131°2	3″04	3*n*	LM
1892.52	134.2	3.13	1*n*	Lv
1897.75	136.7	3.27	1*n*	See
1899.78	133.4	3.11	5*n*	Doo
1903.60	134.3	2.89	2*n*	β

[β (**IX**).... β (*Mon. Not.* **XXXVII**, 78).... Cin5.... LM .... Lv (*A. J.* 278) (*Proc. Haverford Coll. Obsy.* 1892).... See (3496).... Doolittle (*Pub. Flower Obsy.* **I, II**)... β6...]

9582. **OΣ 384.** Unchanged. A distant star measured 39 32
by Secchi.

1869.98	196°2	0″96	5*n*	Δ
1886.58	194.9	1.06	3*n*	Per
1898.63	195.2	0.95	4*n*	Hu
1901.47	192.7	0.98	1*n*	β

[Ma (**XI**)... OΣ (**IX**)... Da3... Se... Du... Δ (**I**)... Newcomb (*Wash. Obsy.* 1874) ... Per... T (2899, 2991)... Glasenapp (**III**)... Brown (3646)... Hu (*Pub. L. O.* **V**)... Maw (**IV**)... β6...]

9583. **H 2895.** The following are the only observations 39 42
since H:

AB	1904.91	305°8	9″37	3*n*	β6	8.9... 9.7
AC	1905.01	14.5	40.32	2*n*	β6	...10.4

39^m 50^s **9584.** **OΣ (App) 190.** No change. The faint star noted with the 18½-inch.

AB	1901.49	299°.1	11″.74	2*n*	β
AC	1901.49	316.2	67.53	2*n*	β

[Δ (I)...β^1...Franz (3080)...β^5...]

39 58 **9585.** **β 468.** Discovered with the 6-inch. No change.

1878.58	181°.1	9″.77	1*n*	OΣ
1884.60	182.2	9.72	2*n*	HΣ
1891.63	183.0	9.81	2*n*	β
1899.42	183.0	9.58	2*n*	β
1900.81	182.7	9.71	4*n*	Doo

[β (**IX**)....β (*Mon. Not.* **XXXVIII**, 78)....β (3114)(*Pub. L. O.* **II**)....Δ (**I**)....OΣ (**X**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

39 58 **9586.** **Σ 2577.** (= **S 724.**) Fixed.

1868.92	262°.8	5″.74	4*n*	Δ
1895.67	263.5	5.98	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...H^1... Se...Δ (**II**)...Glasenapp (**IV**)...]

40 . **9587.** **Howe 51.** From Cin^5. Since Part I was in type, I have identified this as DM (4°) 4215, the R. A. of which is 19^h 39^m 40^s. The recent measures show no material change.

1905.37	199°.3	18″.82	2*n*	β^6	9...12

40 **9588.** **O. Stone 48.** From Cin^5. There is nothing in this place. There is no doubt of its identity with β 467 (No. 9580), the Cincinnati place having an error of about 18′ in declination, and 180° in the position-angle.

40 6 **9590.** **β 146.** Discovered with the 6-inch. In a low-power field with 56 *Sagittarii*, 43^s *f* and 7′.4 *s* of that star.

1891.73	308°.4	0″.91	3*n*	β
1893.70	315.1	1.07	3*n*	Wilson
1897.74	305.8	1.09	3*n*	A
1901.54	312.1	1.15	3*n*	Doo

[β (**III**) ... β (*Mon. Not.* **XXXIV**, 59) ... β^3... β (3114)(*Pub. L. O.* **II**) ... Wilson ( )... A (*A. J.* 429)... Doolittle (*Pub. Flower Obsy.* **II**)...]

40 12: **9591.** **𝕳 N. 113.** No double star found in this place in 1874; and again carefully looked for in 1901. There is no doubt of the identity of this with Σ 2578 (No. 9607).

[β^5... Espin (*Mon. Not.* **LXII**, 533)...]

40 23 **9592.** **O. Stone 49.** Apparently fixed.

1898.74	6°.2	1″.64	3*n*	Hu	8.5...9.0
1903.60	6.4	1.50	2*n*	β	8.5...8.9

[Cin^5... Wilson (Cin^{10})... LM... Collins (*Proc. Haverford Coll. Obsy.* 1891)... Sellors (3303) .... See (3496) .... Hu (*Bul. L. O.* No. 44) .... Scott (*Mon. Not.* **LXIV**, 52)...β^6...]

40 25 **9593.** **β 1301.** This is 27^s *f* and 3′ *n* of β 468. No other measures.

[β^5...]

9594. **β 55.** A pair of small stars about 3′ *s* of γ *Aquilae.* Not in the DM. 40^m 30^s

AB	1898.57	30°.2	3″.67	1*n*	β

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...]

9595. **A. G. 237.** Double in *A. G. Leiden.* Measures by β^6. 40 37

9596. **A 108.** No other measures. 40 38

[A (3668)(*Bul. L. O.* No. 11)...]

9601. **Da 13.** Discovered by Dawes with his 8¼-inch refractor. Without change. 40 58

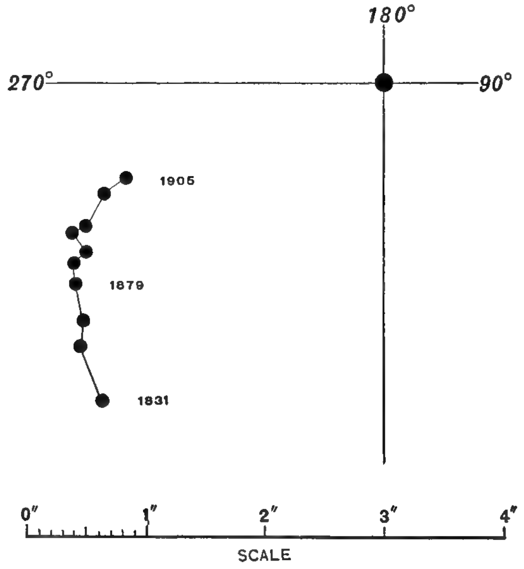
1875.60	265°.0	2″.19	5*n*	Δ	7.2...11.4
1889.09	263.3	2.02	2*n*	HΣ	
1905.60	268.3	1.97	1*n*	β	

[Da^4...Da (*Mon. Not.* **XXIV**, 117)...Δ (I)...WS^2...HΣ (**XII**)...β^6...]

9602. **Σ 2576.** (= **𝕳 N. 109** = **Sh 300.**) The proper motion from meridian observations, which would be a mean of the two components, is given: 41 0

Stumpe	0″.474 in 175°.6
Porter	0.447 in 180.0

The relative change may be due to orbital motion, or to a small difference in the proper motions of the components, with the probabilities in favor of the first.



Σ 2576.

1831.80	318°.8	3″.60	3*n*	Σ
1851.82	311.4	3.40	3*n*	OΣ
1865.04	308.6	3.23	6*n*	Δ
1879.69	303.5	3.11	2*n*	Hl
1884.68	300.7	3.03	3*n*	Hl
1888.77	300.1	2.90	7*n*	HΣ
1890.81	296.1	2.92	3*n*	Maw
1895.68	296.2	2.81	2*n*	Collins
1903.57	292.1	2.56	3*n*	Do
1905.14	290.8	2.33	3*n*	β

There are two small stars not previously measured:

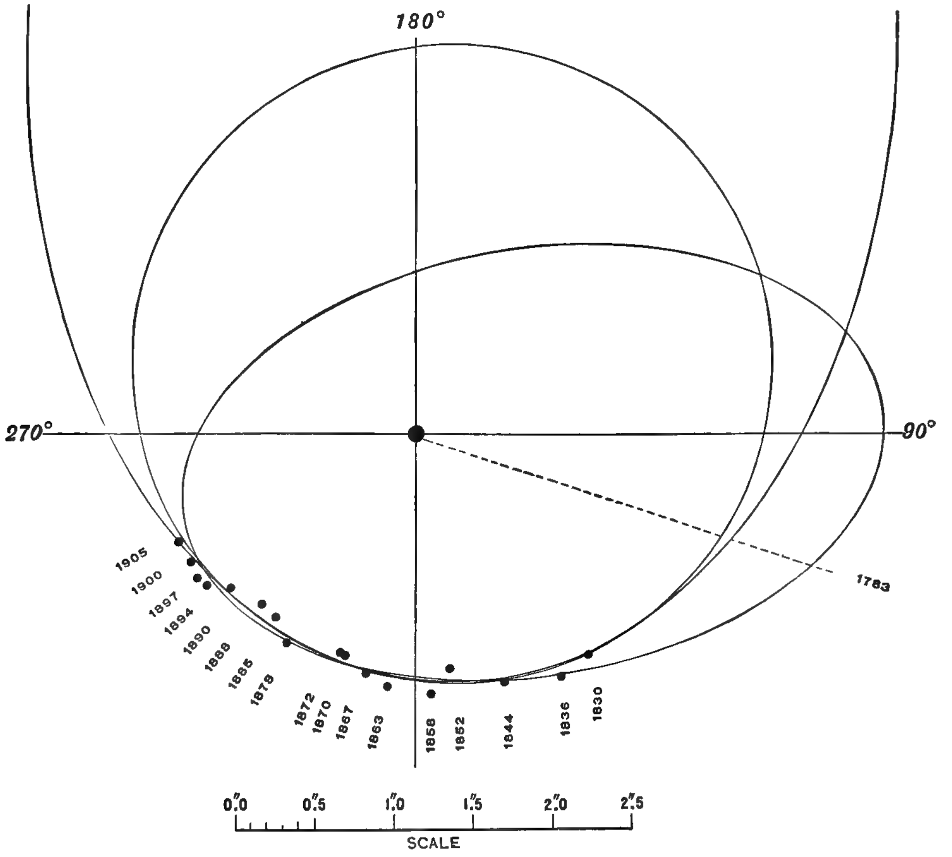
AC	1905.83	315°0	14″65	1*n*	β
AD	1905.14	240.2	17.82	2*n*	β

[Ma (*F. S.* I) ... Ma (**X, XI, XIII, XV**) ... H¹ ... H (**IV**) ... Se ... Se² ... Wr ... Ra (**XXVI**) ... Du ... Hd ... Flm ... OΣ (**IX, X**) ... Δ (I, II) ... Δ (1194, 1475) ... Do (2199, 2316, 3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13) ... WS ... WS² ... Gl ... UL ... Sk ... Per ... Per (2559) ... Sp (2133) ... Sp (**II**) ... de Ball (2753) ... En (1674, 2677) ... Je (2449) ... 'Ho (2978) ... Hl (**I, II**) ... Hl (*Wash. Obsns.* 1882, 1884) ... *Proc. Haverford Coll. Obsy.* 1892 ... Maw (I) ... Glasenapp (**III**) Collins (*A. J.* 378) ... Knorre (3300) ... *Annals Toulouse Obsy.* **III** ... HΣ (**XII**) Thiele (3837) ... Sk⁵ ... Biesbroeck ... β⁶ ...]

41^m 1^s **9603.** **See 395.** The only later position is:

1899.26	107°3	1″74	3*n*	Cogshall

[See (*A. J.* 431) ... Cogshall (*A. J.* 486) ...]



δ Cygni. Σ 2579.

41 8 **9604.** **β 828.** Discovered with the 15½-inch at the Washburn Observatory. Without change.

1887.92	5°6	3″02	4*n*	Com
1891.73	9.0	2.74	3*n*	β
1899.42	9.4	2.57	2*n*	β
1901.54	7.9	2.66	3*n*	Doo

[β (**XII**) ... β² ... β (3114)(*Pub. L. O.* **II**) (*Pub. Y. O.* I) ... Com (**VI**) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

41 13 **9605.** δ *Cygni.* **Σ 2579.** (= **H** I. 94 = **Sh 304.**) Binary of long period. Although several orbits have been computed, it is obvious from an inspection of the measures, and the shortness of the described arc, which is but little more than 90° since the first complete measures, that nothing can be known at this time of the period, or any element of the real orbit. There has been but little change in the distance, and it will probably be necessary to observe it for another century to get the necessary data for determining the apparent and real orbits. Many of the measures have large obvious errors in both angle and distance, and should be rejected in any future investigation of the orbit.

Seventeen positions (1830 to 1905) by leading observers, at short intervals of time, are shown on the diagram. Many other measures might have been included, but they would serve no purpose so far as the present question is concerned, and add nothing to the weight of the evidence bearing upon the orbit of this system. In fact, putting in all the measures, good, bad, and indifferent, would only exaggerate the uncertainty about this, which is already sufficiently apparent from a use of only the best material.

I have shown on the diagram three possible orbits of this system, not with the idea or purpose of adding anything to our knowledge of the motion, but rather to emphasise the wholly indeterminate character of the problem presented. The arcs of the large ellipse and the circle are identical so far as the complete measures are concerned, and represent these positions as perfectly as they are ever likely to be represented, even when a complete revolution has been performed. These observations can also be represented precisely as well by an ellipse with the principle star outside altogether.

The large ellipse gives a period of about 1040 years, the circle 420 years, and the small ellipse 300 years. The true period may be anywhere between these limits, or perhaps outside of both. It must be remembered that in dealing with a short arc, the agreement of observed and computed positions, however close and satisfactory it may be, does not even tend to prove that the orbit so found is correct, or anything like the real orbit.

The proper motion of the system is 0″.055 in 49°.0 (Auwers).

1783.72	71°.6	....	1*n*	♅
1830.21	37.9	1″.78	6*n*	Σ
1836.52	31.9	1.80	4*n*	Σ
1844.78	19.6	1.68	3*n*	OΣ
1852.70	8.4	1.51	3*n*	OΣ
1858.71	3.4	1.65	3*n*	OΣ
1863.74	353.8	1.61	3*n*	OΣ
1867.60	348.5	1.55	7*n*	Δ
1870.57	342.9	1.47	7*n*	Δ
1872.81	341.7	1.47	2*n*	OΣ
1878.59	328.2	1.56	3*n*	Δ
1885.73	322.7	1.46	4*n*	Hl
1888.93	318.1	1.45	4*n*	Hl
1890.57	310.1	1.52	4*n*	Hl
1894.95	308.1	1.64	11*n*	Com
1897.31	303.6	1.65	9*n*	Hu
1900.42	299.8	1.63	3*n*	Lohse
1905.64	294.5	1.64	4*n*	β

The orbits found differ widely in all respects. The following are the respective periods and dates of the last measures used:

1842	Hind	178.7 yrs.	*A. N.* 565
1856	Behrmann	280.56	*A. N.* 1517
1865	Behrmann	415.11	*A. N.* 1561
1887	Gore	376.66	*Mon. Not.* L, 398
1894	Burnham	Indeterminate	*Mon. Not.* LVII, 449

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...H^{2}... H (236)...Bp...Da^{3}...Da^{4} ...Da (1552)...Da (*Ast. Reg.* **III**, 225)...Wr... Fl... J^{2}... Σ (*Pos. Med.* 297) K (463, 1519)...Hind (*Mon. Not.* **VII**, 96)...Hind (*Mem. R. A. S.* **XVI**, 291) ... Hind (565)... Se... Se^{2}... Se (1072, 1564, 1614)... Se (*Mon. Not.* **XXVI**, 63)... Flm... Behrmann (1517, 1561, 1569)... Wn (**V**)... OΣ (**IX**)... Δ (1475, 1573, 1736, 1799, 1888, 1979, 2081, 2193)...Δ (**I, II**)... Hd... Ba (**II**)... Kn... Kn (*Mon. Not.* **XXV**, 275)... Bru... Bru^{2}... WS^{2}... Sk... Sk^{2}...Newcomb (*Wash. Obsns.* 1867)...Du...Bl (**V**)...Pl...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2146, 2199, 3931)...En (1518, 1674, 2677, 2742)...Sadler (*Observatory* **IX**, 307)... Perry (*Eng. Mech.* **XXXVI**, 65; **XXXVIII**, 192; **XXXIX**, 11) (*Observatory*, Oct. 1886)...Per...Per (2559)...Kustner (2584)...T (2866)...Ho (2978)...β^{1}...Burton (*Copernicus* **I**, 54)...Hl (*Wash. Obsns.* 1880–86)...Hl (*A. J* 302) (**I, II**)....See (*Beob. Berlin* No. 6, 1892)....Sadler (*Observatory*, Sept. 1886)...*Proc. Haverford Coll. Obsy.* 1891–92)...Gore (*Mon. Not.* **L**, 398)... Maw (**I, III, IV**)...Glasenapp (**III**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A J.* 378)....Com (**X**)....See (*A. J.* 359)....Hu (*A. J.* 397, 427)....Lehman (*Pub. A. S P.* **IX**, 141)...β (*Mon. Not.* **LVII**, 449)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486)...Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)... Sk^{5}...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...β^{6}...]

41^{m} 14^{s} **9606.** **A** 274. No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

41 15 **9607.** **Σ** 2578. (= **♅ N.** 13 = **Sh** 303.) Fixed. A distant star measured by Glasenapp, 357°.8 : 46″.21 (1894.63) 2*n*.

1865.86	125°.9	14″.72	3*n*	Δ
1904.47	124.8	15.09	1*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... Ra (**XXI**)... Bl (**V**)... Δ (1209)... Δ (**I, II**)... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

9609. **♅ V.** 137. (= σ 638 = **S** 725 = **OΣ (App)** 191.) The distance in ♅ is too small. Very little relative change. 41^{m} 22^{s}

1825.22	29°.2	38″.74	3*n*	S	7 ...10
1850.04	28.7	38.35	4*n*	OΣ	6.5... 8.5
1875.34	28.1	38.13	3*n*	Δ	6.0... 8.2
1878.73	27.5	38.51	3*n*	Doubiago	
1905.75	27.3	38.30	2*n*	β	

[Ra (**XXI**)... Δ (**I**)... OΣ (**X**)... Franz (3080)...β^{6}...]

9611. **H** 1437. The only measure is this: 41 28

1905.81	242°.2	15″.51	1*n*	β^{6}	9.0...12.5

9612. **H** 1436. Double in *A. G. Leipzig.* The only measures are: 41 34

1903.73	302°.2	8″.14	3*n*	Miller	9...10

[Miller (4022)...]

9613. **OΣ** 385. Without change. 41 42

1869.29	51°.8	1″.32	6*n*	Δ
1898.03	53.6	1.26	6*n*	Hu
1901.55	54.4	1.17	3*n*	Doo

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)... Sk^{2}... Per... Per (2685)... HΣ (**XII**)...Hu (*A. J.* 397) (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9614. **H** 1438. Nothing but this since H: 41 4

1905.72	79°.3	16″.14	1*n*	β^{6}	9.0...10.8

9617. χ (17) *Cygni.* **Σ** 2580. (= **♅ IV.** 11 = **Sh** 301 = **Sh** 305.) The two pairs in Sh are identical, though different places are given. The components are relatively fixed, but have a large common proper motion of 0″.435 in the direction of 181°.7 (Auwers). This movement is almost exactly the same as that of Σ 2576. 41 52

1849.14	73°.0	25″.71	11*n*	OΣ
1863.77	72.4	25.70	3*n*	Δ
1884.93	71.5	25.90	9*n*	Per
1892.15	71.2	25.63	4*n*	Gla
1905.69	70.9	25.50	2*n*	β

[Ma (*F. S.* **II**)... Ma (**XIII, XV**)... Σ^{1}... H (**IV**)...Wr... Se^{2}... Ra (**XXI**)...**En** (1518, 1674)....Kn....WS....Gl....WS^{2}.... Du....Δ (1125)....Δ (**I, II**).... Je (2407)...Sk...Sk^{3}... Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Pk ...Bl (**V**)... Per... Per (2559)... Engelhardt (**II**)... Sp (**II**)... OΣ (**IX, X**)... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 530) ...Sk^{5}...β^{6}...]

9618. **H** 898. This was carefully looked for with the 40-inch in 1901, but nothing of this description found. Many faint pairs in the vicinity. 41 55

[β^{5}...]

9619. **Ho** 114. (AC = **♅ N.** 110 = **S** 726 = **OΣ (App)** 192.) Declination in ♅ 11′ in error. Faint star B discovered by Hough. The distance of D appears to be very slowly decreasing. This is DM (32°) 3557. 41 59

A and D

1840.82	205°.2	33″.10	2*n*	OΣ	6.2...7.8
1875.34	202.3	32.07	3*n*	Δ	6.0...8.0
1885.84	201.5	31.67	1*n*	Ho	
1901.50	200.4	31.44	3*n*	β	7.2...8.2

These are all the other measures of AB:

1896.18	240°.1	3″.29	2*n*	Ho	...13.0
1901.53	233.7	3.15	1*n*	β	...13.5
1901.75	234.1	3.28	2*n*	Doo	

The very small star C, noted with the 40-inch, has not been previously seen.

[Δ (I)...OΣ (X)...β (*Mon. Not.* **XXXIV**, 379)...Franz (3080)...Ho (2779, 3558)...β^{5}...]

$42^m\ 16^s$ **9623.** **β 147.** Discovered with the 6-inch. No motion.

1877.67	300°.4	8″.55	2*n*	Sp
1893.54	297.6	8.86	3*n*	Lv
1899.16	297.1	8.75	6*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (I)...Sp (**II**, p. 137)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* **I**)...]

42 23 **9626.** **H 1439.** The only later position is:

1902.67	199°.6	30″.21	2*n*	Es	7.0...9.0

[Espin (*Mon. Not.* **LXIV**, 679)...]

42 29 **9627.** **Hu 758.** With two later measures the mean is:

1904.43	147°.6	0″.96	3*n*	Hu	8.8...9.0

[Hu (*Bul. L. O.* No. 65)...]

42 44 **9628.** **See 396.** A later position is:

1899.58	270°.4	6″.45	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

42 49 **9630.** **Da 10.** Discovered by Dawes in 1859. Apparently fixed.

1875.12	316°.6	0″.60	2*n*	OΣ	8.0...9 5
1875.62	311.9	0.47	6*n*	Δ	8.2...9.0
1900.61	312.2	0.54	2*n*	A	8.5...9.5

[Da^{4}...Da (*Mon. Not.* **XXIV**, 117)...Δ (I)...WS...WS^{2}...Sp (2133)...Sp (**II**)...Flm...OΣ (**X**)...A (*Bul. L. O.* No. 11)...Do (3931)...]

43 2 **9633.** **β 829.** Discovered with the 15½-inch at the Washburn Observatory. The measures are not consistent in angle, but there is probably no material change. The following are all the other measures:

1887.71	314°.2	0″.93	3*n*	Com
1892.52	319.0	0.80	2*n*	Lv
1892.70	306.6	0.60	1*n*	Ho
1896.54	308.6	0.72	4*n*	Lv
1898.64	308.9	0.83	3*n*	A

[β (**XII**)....β^{2}....Com (**VI**)....Lv (*A. J.* 278, 407)(*Proc. Haverford Coll. Obsy.* 1892)...Ho (3234)...A (3585)...]

9634. *π Aquilae.* **Σ 2583.** (= **H I. 92** = **Sh 306.**) Relatively fixed; but a common proper motion of 0″.019 in 258°.2 (Auwers). $43^m\ 3^s$

1848.24	122°.3	1″.52	4*n*	OΣ
1867.18	119.2	1.36	4*n*	Δ
1884.80	117.0	1.44	10*n*	Per
1897.89	117.2	1.44	3*n*	Hu

There is a distant 12.5 m star of which there are no early measures.

1886.65	309°.2	33″.29	1*n*	T
1886.91	306.0	30.40	1*n*	T
1905.78	304.2	33.58	2*n*	β

[Ma (*F. S.* **I**)....Ma (304, 324)....Ma (**IX, X, XI, XIII**)....H^{2}....Bes....Bp....H (85)...Mh...Ek (**I, III**)...Wr...Da^{1}...Da^{3}..Da^{4}...K...K (409)...Wh...Se...Se^{3}...Se (1017)...Ra (**XXXI**)...Newcomb (*Wash. Obsns.* 1867)...Do (2199, 3680)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Kn...WS...WS^{2}...Gl...Sk^{2}...Hd...Du...Δ (1125)...Δ (**I, II**)...OΣ (**IX**)...Perry (*Eng. Mech.* **XXXVI**, 65)....Je (2407, 2772)..Per....Per (2559, 2749)....UL....Lv^{1}....En (2677)....T (2786)....Sp (**II**)....Knorre (*Beob. Berlin*, No. 6, 1892)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Maw (**I, III, IV**)...Glasenapp (**I, III**)...Collins (*A. J.* 378)...Knorre (3300, 3518)...Lehmann (*Pub. A. S. P.* **IX**, 141)....Hu (*A. J.* 427)....Solá (3529, 3679)....Coleman (*Mem. R. A. S.* **LIII**)....Furner (*Mon. Not.* **LXVI**, 29)...Lohse (*Pub. Potsdam Obsy.*)...β^{6}...]

9635. **Σ 2592.** Fixed. 43 6

1869.42	305°.0	1″.33	5*n*	Δ
1879.64	304.9	1.17	2*n*	Do

[Ma (*F. S.* **I**)....Ma (**XI**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...Bryant (*Mon. Not.* **LX**, 512)...]

9636. **Σ 2581** *rej.* The measure in Mh evidently belongs to some other star. 43 8

1848.66	256°.3	11″.54	1*n*	Mh	
1879.54	281.3	37.88	3*n*	Cin^{5}	7.8...9.3
1901.48	282.5	38.24	3*n*	β^{5}	8.0...9.6

9637. **Σ 2584.** No change. 43 12

1867.04	299°.0	1″.77	3*n*	Δ
1905.72	297.7	1.64	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...H (**V**)..Se...Δ (**II**)...Glasenapp (**III**)...Lewis (*Mon. Not.* **LXVI**, 29)...β^{6}...]

9638. **H 601.** The place in H is somewhat in error. Identified and measured. The magnitude in DM is 6.1. 43 12

1904.43	243°.3	24″.59	2*n*	β^{6}	6.7...12.7

9640. **Σ 2582.** Fixed. 43 30

1866.36	261°.0	2″.45	3*n*	Δ
1905.67	261.8	2.34	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Δ (**II**)...LM...Glasenapp (**I**)...β^{6}...]

9641. **Σ 2586.** Fixed. 43 32

1868.42	227°.7	3″.59	4*n*	Δ
1905.64	228.6	3.55	1*n*	β

[Ma (*F. S.* **I**)....Ma (**X**)....Se....Δ (**II**)....Glasenapp (**III**)....Lewis (*Mon. Not.* **LXVI**, 29)...β^{6}...]

43m 34s **9642.** **H 2900.** The only measure is:

1905.73 56°3 18″91 4*n* Doo 8.8...10.5

43 39 **9643.** *ζ Sagittae.* **A. G. Clark 11.** (AC = **Σ 2585 = H II. 30 = Sh 307.**) The close pair was discovered by Alvan G. Clark in 1875 with the 12-inch now at the Lick Observatory. So far the change, if any, has apparently been in distance. The system has a proper motion of 0″042 in 37°7 (Auwers).

The following are all the measures:

A and B

1875.74	316°9	0″4±	1*n*	Δ	5.2...6.2
1878.11	157.6	0.29	5*n*	β	
1880.20	153.3	0.31	3*n*	β	5.5...6.5
1882.62	156.9	Cun.	1*n*	OΣ	
1883.41	176.6	0.17	8*n*	En	
1884.05	152.1	0.2±	5*n*	Young	
1886.79	177.3	Obl.	2*n*	HΣ	
1888.77	Single		2*n*	HΣ	
1889.57	185.0	0.12	2*n*	β	
1890.04	192.8	0.2±	3*n*	HΣ	
1890.53	179.7	0.12	3*n*	β	
1891.61	182.8	0.15	3*n*	β	5.0...6.5
1891.71	186.0	0.25±	4*n*	HΣ	
1895.68	171.7	0.24	2*n*	Lewis	
1898.81	170.9	0.47	2*n*	Bryant	
1898.92	164.0	0.28	5*n*	Lewis	
1899.26	158.8	0.29	2*n*	Bowyer	
1901.06	158.7	0.24	2*n*	A	6.0...6.3
1901.67	155.3	0.18	9*n*	Bryant	
1903.73	158.4	0.3±	1*n*	Biesbroeck	
1903.81	154.3	0.21	2*n*	Bowyer	
1905.87	148.2	0.20	2*n*	A	

There is no change in the position of the Struve companion.

AB and C

1867.38	312°8	8″62	4*n*	Δ
1884.12	312.1	8.78	6*n*	Per
1889.85	311.1	8.66	8*n*	HΣ

[Ma (*F. S.* **II**)...Ma (**IX, X, XIII**)...Σ^1...H (**V, VII**)...Bp...Da^1...Da^3...H^1...Wr...J^2...Mu...Se...Se^3...Ra (**XXI**)...Ba (**II**)...OΣ (**IX, X**)...Δ (1116)...Δ (**I, II**)...Flm...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 2242)...P. Smythe (*Mon. Not.* **XXIII**, 8)...Pk...Hd...WS...Gl...Sp (**II**)...UL...Per...Per (2559, 2749)...En (2678)...See (*Beob. Berlin*, No. 6, 1892)...Glasenapp (**I**)...β (*Am. Jour. Sci.* April 1879)...β^1...β^2...β^3...β (2957, 3048, 3114)(*Pub. L.O.* **II**)....Glasenapp (**III**)....Big (*Bul. Ast.* **XII**, 299)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 512; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXVI**, 29)...Chofardet (3450)...Solá (3529, 3679)...A (*Bul. L. O.* No. 11)....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)....Biesbroeck....Lohse (*Pub. Potsdam Obsy.*)...]

43 56 **9644.** **OΣ 386.** No change.

1870.15	78°2	0″99	5*n*	Δ
1897.89	76.2	1.03	5*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Se...Da^3...Du...Per...Do (3466)...Hu (*A. J.* 397)(*Pub. L. O.* **V**)...Maw (**IV**)...]

43 56 **9645.** **H 2901.** "A fine double star." Not in O. Arg. S., and more like 9 m (1876). The magnitude in Cord. DM is 9.1.

1878.18	156°4	6″14	2*n*	Cin	8.6...10.7
1905.72	155.2	6.46	5*n*	Doo	8.4... 9.4

[Cin^4...Cin^6...]

43m 59s **9646.** **Hu 77.** The close pair was discovered by Hussey in 1899. No other measures of this. Measures of the wide pair from J^1; erroneously called B. A. C. 6788 in J^2. It is 12s *p* 51 *Aquilae.* The components are SD (11°) 5146 and 5147. Nothing recent but this:

1901.49 319°3 28″75 3*n* β 9.0...9.1

[J^1...J^2...Hu (*A. J.* 480)...β^5...]

44 2 **9647.** **Hu 682.** No other measures.

[Hu (*Bul. L. O.* No. 57)...]

44 11 **9649.** 51 *Aquilae.* **Ho 275.** The principal star has a proper motion of 0″080 in 315°6 (Auwers), which corresponds to the change in B.

1901.56	116°8	20″88	2*n*	β
1903.02	116.7	21.09	6*n*	Doo

[Ho (2977, 3558)...β^5...]

44 15 **9650.** **OΣ 387.** A binary of long and uncertain period. The total angular motion since the first measures by Struve is about 160°, and necessarily there is nothing in the measures to this time to determine even approximately the form of the apparent ellipse. It is probable that the observations of at least another half century will be needed to give a provisional orbit of any value.

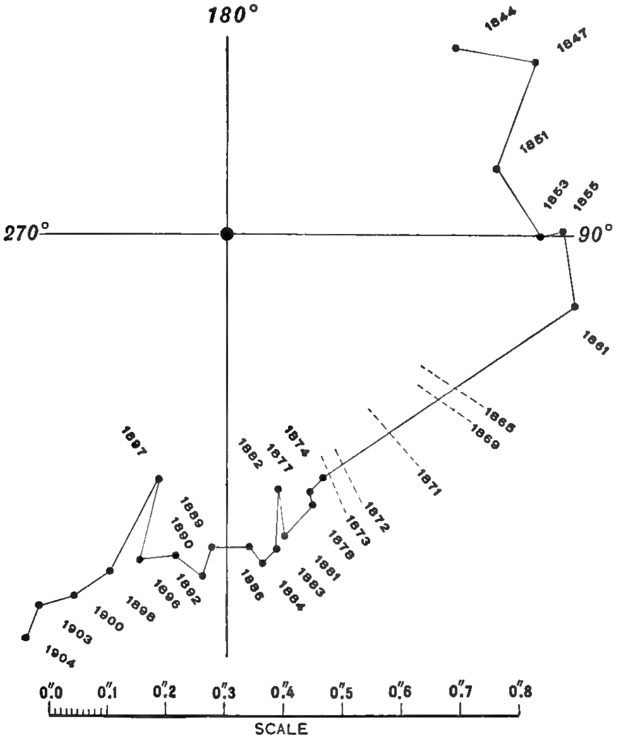
The attempts to find the orbit from insufficient data have resulted as follows:

1888	Glasenapp	110.1 yrs.	*A. N.* 2940
1897	Doberck	75.79 90 134.2 260	*A. N.* 3525

1844.18	129°4	0″50	2*n*	OΣ
1847.73	119.4	0.60	1*n*	Ma
1851.97	103.8	0.47	3*n*	OΣ
1853.75	89.7	0.53	3*n*	Da
1855.63	90.7	0.57	2*n*	OΣ
1861.22	78.4	0.60	2*n*	OΣ
1865.53	56.2	Obl.	2*n*	Δ
1869.92	52.5	Obl.	3*n*	Δ
1871.57	39.6	Obl.	1*n*	Δ
1872.55	26.6	Obl.	1*n*	Δ
1873.72	23.0	Obl.	6*n*	Δ
1874.57	20.7	0.55	1*n*	Δ
1875.41	22.0	0.34	1*n*	Δ
1877.67	17.7	0.46	2*n*	Δ
1878.20	17.5	0.48	7*n*	Hl
1881.61	10.6	0.52	3*n*	Hl
1882.70	11.3	0.44	2*n*	Hl
1883.63	8.9	0.54	3*n*	Hl
1884.69	6.1	0.56	3*n*	Hl
1886.18	4.0	0.53	8*n*	Hl
1889.19	357.2	0.53	8*n*	Hl
1890.62	355.9	0.58	3*n*	Hl
1892.98	350.9	0.55	7*n*	Com
1896.19	345.1	0.57	6*n*	Com
1897.67	344.7	0.48	4*n*	Lewis
1898.83	340.8	0.60	7*n*	Hu

1900.54	337°.4	0″.60	4*n*	Doo
1900.62	336.6	0.72	3*n*	Do
1902.58	335.4	0.64	3*n*	Hu
1903.58	332.1	0.73	3*n*	Lohse
1903.69	334.2	0.68	3*n*	Biesbroeck
1904.66	333.3	0.76	2*n*	Lohse

The 9.5 m star, DM (34°) 3722, is a wide double, and the *f* star of the two is a close pair with a distance of about 1″. This was first noted many years ago with the 18½-inch, but not measured, and is not given in Part I. It is 38s *p* and 5′.5 *s* of OΣ 387.



OΣ 387.

[Ma (**XI, XIII**)...Se...Da^3...OΣ (**IX**)...Δ (2193)...Δ (**I**)...Flm...Perry (*Eng. Mech.* **XXXVI**, 65)... Per... En (2678, 2742)... T (2866, 3186)... Ho (2978)... Sp (2133)...Sp (**I, II, II** App.)...Hl (*Wash. Obsns.* 1881–86)...Hl (**I, II**)... Glasenapp (2940).... Glasenapp (*Orbites des Étoiles Doubles*, etc., 1889).... Callandreau (*Bul. Ast.* **XII**, 523)...Big (*Bul. Ast.* **XII**, 299)...Com (**X**)...Hu (*A. J.* 397)(*Pub. L. O.* **V**)(*Bul. L. O.* No. 40)...Do (2322, 3466, 3525, 3680)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXVI**, 29)....HΣ (**XII**).... Doolittle (*Pub. Flower Obsy.* I)...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1081)

44m 25s **9652.** **A. G. 238.** Double in *A. G. Leipzig*, and measures from that catalogue, p. 250.

44 37 **9655.** **H IV. 99.** Many stars in the field nearer than C, which is DM (17°) 4109. The following are all the measures:

A and C

1879.54	255°.8	69″.56	1*n*	Cin^5	8.0...8.5
1904.44	256.3	68.72	2*n*	β^6	8.2...8.7

A and B

1879.54	86°.4	24″.81	1*n*	Cin^5	...10.0
1904.44	85.2	25.24	2*n*	β^6	...10.3

9656. **A. G. 239.** Double in *A. G. Harvard.* Measures by Espin. 44m 44s

1905.66	257°.6	13″.59	1*n*	β

[Espin (*Mon. Not.* **LXIV**, 680)...β^6...]

9657. *α Aquilae.* **Σ 10, App. II.** (= **H VI. 46 = Sh 308.**) 44 55
The distance is increasing from the proper motion of the large star. There are many faint stars nearer α than that measured by Σ. The proper motion is given:

Auwers	0″.646	in	53°.2
Bossert	0.643	in	53.8

Some of the measures are:

1836.29	322°.1	152″.37	6*n*	Σ
1855.19	317.5	153.82	15*n*	OΣ
1868.07	314.2	154.79	6*n*	Δ
1886.71	310.0	157.56	2*n*	Eng
1905.32	305.7	161.34	3*n*	β

The measures of Σ and β (1836–1905) give 0″.661 in 55°.1 for the proper motion of A.

[Da (*Mon. Not.* **XXIV**, 120)...WS...WS^2....Gl...Flm...Pk...Sk...Δ (1574)... Δ (**II**)...Engelhardt (**II**)...OΣ (**X**)...Sk^5...β^6...]

9659. **β 361.** Discovered with the 6-inch. In a low-power field with 12 *Vulpeculae.* No motion. 45 7

1892.52	350°.0	3″.96	2*n*	Lv
1899.71	348.9	3.86	3*n*	Doo

[β (**VI**)...β (2062)... Δ (**I**)... Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892) ...Doolittle (*Pub. Flower Obsy.* I)...]

9660. **A 718.** (AB = **Σ 2588 = H III. 112 = S 728.**) The 45 11
smaller component of Σ 2588 was found to be a close pair by Aitken. With another measure, the mean result is:

B and C

1904.45	52°.4	0″.27	3*n*	A	8.2...8.7

There is no change with reference to A:

A and BC (= Σ 2588)

1867.02	160°.4	9″.49	4*n*	Δ
1904.45	160.0	9.52	2*n*	A

[Ma (**XI**)... Du... Δ (**II**)... Ma (*F. S.* I)... Glasenapp (**IV**)... Espin (*Mon. Not.* **LXII**, 530)...A (*Bul. L. O.* No. 61)...]

(See p. 1081)

9661. **Espin 84.** Discovered by Espin. The principal 45 13
star is Bradley 2529. There is another 12 m star, 98°.2:22″.4.

1902.44	161°.0	11″.80	2*n*	β	7.0...11.9

[Espin (3784)...β^6...]

9662. **H 1441.** Nothing since H but the following: 45 26

AB	1905.72	37°.9	16″.22	1*n*	β^6	9.5...11.5
AC	1905.72	193.3	28.46	1*n*	β^6	...10.8

9663. **β 148.** Discovered with the 6-inch. There seems 45 27
to be slow retrograde motion in the angle of the close pair.

A and B

1875.26	333°.2	0″.91	4*n*	Δ
1879.25	331.2	0.87	1*n*	Cin
1888.51	325.9	0.79	1*n*	Lv

1891.63	323°3	0″78	2*n*	β
1893.66	322.5	0.78	4*n*	Wilson
1898.75	321.4	0.95	3*n*	Doo
1905.58	315.0	0.66	1*n*	β

A and C

1893.62	63°3	26″51	1*n*	Wilson
1898.75	64.0	27.13	3*n*	Doo
1905.02	64.0	26.71	2*n*	β

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)...Cin^5...Lv^1...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

$45^m\ 28^s$ **9664.** **Σ 2587.** *Aquilae* 180. No material change.

1866.08	102°8	3″98	4*n*	Δ
1903.70	101.9	3.84	3*n*	Furner

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...OΣ (**IX**)...Δ (**II**)...Per...Per (2749)...UL...Maw (**II**)...Glasenapp (**III**)...HΣ (**XII**)...Furner (*Mon. Not.* **LXIII**, 403; **LXIV**, 803)...]

45 28 **9665.** **H 2903.** The measures since H show no change.

1879.43	156°5	7″79	1*n*	Cin^5	8.5...12.0
1905.72	156.3	7.70	2*n*	β^6	8.8...11.6

45 54 **9670.** **H 5152.** In another observation, P = 157°2. "Double" in *Cordoba Zones.*

1877.56	154°3	6″20	2*n*	Cin	8.2...8.7
1900.70	154.8	5.98	1*n*	Lunt	

[Cin^4...Lunt (*Annals Cape Obsy.* **II**)...]

46 6 **9672.** **H 2905.** The only measure is:

1902.69	196°9	8″61	2*n*	Es	9.1...10.6

[Espin (*Mon. Not.* **LXIV**, 679)...]

46 15 **9674.** **Espin —.** Discovered by Espin.

1905.69	172°1	6″64	2*n*	β	8.6...10.8

[Espin (*Mon. Not.* **LXIV**, 238)...β^6...]

46 15 **9675.** **Espin 23.** C is DM (44°) 3264. Nothing later but the following:

AB	1905.67	139°3	8″07	2*n*	β	8.6...12.5
AC	1905.67	326.3	31.03	2*n*	β	...9.5

[Espin (*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n* **III**, 228)(*A. N.* 3717)...β^6...]

46 19 **9677.** 19 *Cygni.* **H 603.** "Triple; A *ruddy.*" R. A. erroneous in H. The principal star has a proper motion of 0″110 in 6°1 (Bossert). The later measures are:

A and B

1887.81	102°1	53″92	2*n*	Eng	6.0...11.0
1894.85	103.0	54.24	2*n*	Eng	
1902.02	103.8	54.22	2*n*	β	6.0... 9.8

B and C

1902.02	12°8	21″79	2*n*	β	...11.7

[Cin^5...Engelhardt (**II**, **III**)...β^5...]

9678. **β 978.** Discovered with the 18½-inch. No change. $46^m\ 22^s$

1889.84	235°6	0″99	4*n*	Sp
1898.64	233.8	1.05	3*n*	A
1901.61	235.9	0.98	3*n*	Doo

[β (**XIII**)...β^3...Sp (**III**)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9679. **Σ 2589.** (= **H II. 95** = **S** 727.) Fixed. 46 25

1866.69	297°5	4″97	3*n*	Δ
1896.22	296.9	5.16	5*n*	Coleman

[Ma (*F. S.* **I**)....Ma (**XI**, **XIII**)....Se....Δ (**II**)....T (3185)....Glasenapp (**II**)....Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

9681. **H 1443.** Measured at the Kirkwood Observatory: 46 28

1903.97	195°0	18″69	3*n*	Howard	9.1...9.7

9682. **Σ 2590.** (= **H II. 28.**) Fixed. A minute pair *sp*, Webb. 46 32

1867.32	309°7	13″31	4*n*	Δ
1902.74	308.6	13.42	1*n*	Lewis

[Ma (*F. S.* **I**)....Ma (**XI**, **XIII**)....H (**IV**)....Δ (**II**)....Glasenapp (**V**)....*A. G. Leipzig*, p. 250...Lewis (*Mon. Not.* **LXIII**, 403)...]

9683. **A. G. 240.** Both stars in *A. G. Bonn.* Measures by Espin (3717). 46 35

9686. **β 979.** Discovered with the 18½-inch. No motion. 46 57

1893.53	335°9	2″25	4*n*	Lv
1899.70	335.9	2.05	4*n*	Doo
1900.58	333.4	2.10	2*n*	A

[β (**XIII**)....β^3....Lv (*A. J.* 382)....A (*Bul. L. O.* No. 11)....Doolittle (*Pub. Flower Obsy.* **I**)...]

9688. **Σ 2591.** Fixed. 46 57

1866.63	107°8	29″24	3*n*	Δ
1905.67	107.3	29.31	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Δ (**II**)...T (3185)...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III**...β^6...]

9689. **OΣ 389.** (= **H 1445.**) Fixed. Error of 1^m R. A. in *Poulkowa Catalogue.* 46 58

1867.81	183°2	12″51	4*n*	Δ
1898.66	183.0	12.66	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

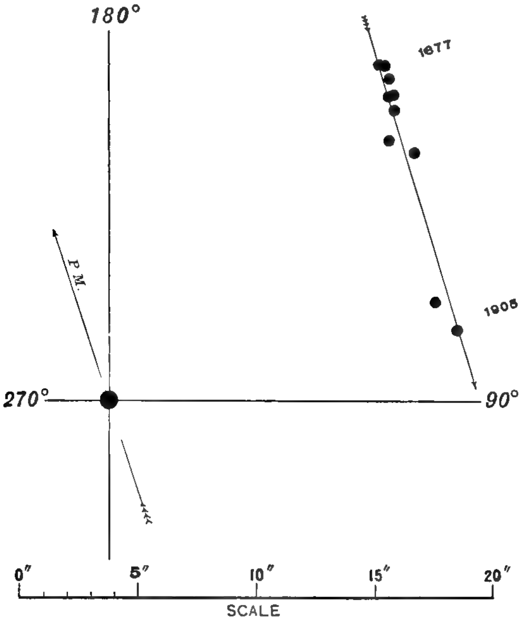
(New Companion by Espin, 306°5 : 9″42 (1906.66) 3*n*)

9690. **H 2904.** This star has a large proper motion, and the change in the position of the companion corresponds to this movement. This is given as follows: 47 8

Stumpe	0″443 in 193°7
Porter	0.444 in 199.2
Radcliffe	0.466 in 195.3

The distances by Herschel are greatly underestimated. The following are all the measures:

1830.62	173°5	20″ ±	1*n*	H	
1834.60	170.6	20 ±	1*n*	H	
1875.10	144.7	20 ±	3*n*	β	
1877.73	141.4	18.30	2*n*	Cin	6.2...10.2
1878.71	140.8	18.39	1*n*	β	
1879.48	139.2	18.13	1*n*	Cin	
1880.67	139.5	(19.22)	1*n*	Pt	



H 2904.

1880.67	137°3	17″73	1*n*	Pt	
1881.55	137.6	17.50	3*n*	β	6.6...10.2
1882.62	135.8	17.26	2*n*	W	
1885.63	133.0	16.29	1*n*	W	
1886.64	129.2	16.62	3*n*	Hl	
1900.79	106.5	(14.38)	1*n*	Solá	
1905.64	101.4	15.06	3*n*	β	

[H (**VIII**)...β1...β4...β (*Sid. Mess.* **V**, 56)...Cin4...Cin5...Wilson (Cin10)... Wilson (*Sid. Mess.* **V**, 30. 58)...Sadler (*Sid. Mess.* **V**, 93)...Holden (2561)... Pt...Flm...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Glasenapp (**I**)...Solá (3679) ...β6...]

47m 9s **9691.** **H 1447.** The only measures since Herschel are by Espin:

AB	1904.61	333°9	18″95	3*n*	Es	7.5...11.8
AC	1905.04	85.6	22.30	3*n*	Es	...13.2

[Espin (*Mon. Not.* **LXVI**, 142)...]

47 19 **9693.** **OΣ 388.** No sensible change.

	A and B			
1865.89	139°5	3″70	3*n*	Δ
1898.64	139.9	3.95	4*n*	Hu
1901.56	140.6	3.82	2*n*	Doo
	B and C			
1865.89	138°4	26″79	3*n*	Δ
1898.63	135.4	27.07	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Da3...Δ (**I**)...Du...Sk2...Per...Jones (***A. J.*** 312) ...Knorre (3300)...Hu (*Pub. L. O.* **V**)...Coleman (*Mem. R. A. S.* **LIV**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

9694. **Σ 2598.** Fixed. 47m 19s

1868.28	149°2	10″99	4*n*	Δ
1905.43	147.3	11.26	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...β6...]

9695. **Ho 580.** No change. In the first Greenwich measure this is called Ho 506. 47 19

1897.62	276°0	0″68	4*n*	Ho
1899.57	271.9	0.72	2*n*	Bowyer
1900.56	274.6	0.77	3*n*	A
1901.90	273.3	0.70	6*n*	Bryant
1904.50	268.7	0.71	4*n*	Doo

[Ho (3557)...A (*Bul. L. O.* No. 11)...Greenwich Obsy. (*Mon. Not.* **LX**, 512; **LXI**, 486; **LXII**, 383; **LXIII**, 503; **LXIV**, 804; **LXVI**, 29)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9696. **A. G. 241.** Measures from *A. G. Leipzig*, p. 250. 47 31

9697. 56 *Aquilae*. **H 900.** Unchanged. The proper motion of 56 *Aquilae* is 0″030 in 216°5 (Auwers). 47 37

1880.12	77°8	46″66	2*n*	β	5.7...11.8
1901.50	76.4	46.44	2*n*	β	6.0...11.5

[*Wash. Obsns.* 1862...β3...β5...]

9698. **Σ 2593** *rej.* The faint companion to B was first noted with the 40-inch. 47 37

AB	1893.54	237°0	12″12	1*n*	Leip
	1905.74	236.0	12.14	1*n*	A
BC	1905.74	300.9	3.31	1*n*	A

[β5...*A. G. Leipzig*, p. 210...]

9700. **H. C. Wilson 17.** Identified and measured: 47 46

1902.02	116°3	17″24	2*n*	β	9.0...10.4

[Wilson (Cin10)...β5...]

9701. **H̥ III. 105.** (= **Σ 2595** *rej.*) This is a faint pair in the field with Σ 48, App. I. There is a third 10m star, 37°0 : 24″0. 47 55

1881.39	214°9	16″31	3*n*	β	9.0...9.5
1901.51	214.8	16.36	2*n*	β	9.4...9.7

[H (**V**)...β4...β5 ..]

9705. **Σ 48, App. 1.** (= **H̥ V. 106 = Sh 310 = OΣ** (Arn) 193.) Relatively fixed. 48 5

1870.22	147°5	42″16	7*n*	Δ
1892.11	147.9	42.36	4*n*	Gla

[Da1.... Se1.... Ra (**XXI, XXVI, XXXV**) .... Δ (**II**)... Je (2343).... Maiebckato (*Obsns.* 1892)...Glasenapp (**III**)...Franz (3464)...]

48m 8s **9707.** 57 *Aquilae*. **Σ 2594.** (= **♅ IV. 14 = Sh 109 = Σ 47, App. I.**) Without change. The proper motion is small, 0″021 in 264°5 (Auwers).

1868.65	171°2	35″79	5*n*	Δ
1880.74	171.1	35.61	1*n*	β
1903.66	171.0	35.71	5*n*	Jouffray

[Ma (**XI**)....Ma (*F. S.* **I**)....Ma (304)....Mh....Ra (**XXI, XXV, XXVII, XXIX, XXXIV, XXXV**)...En...Δ (**II**)...Maiebckato (*Obsns.* 1892)...Je (2343)...β3 ....Glasenapp (**I, III**)....*Annais Toulouse Obsy.* **III**....Jouffray (*Bul. Ast.* **XXI**, 299)...]

48 12 **9709.** **A** 168. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

48 12 **9708.** **Hn** 36. No change.

1888.63	213°2	1″24	3*n*	Com

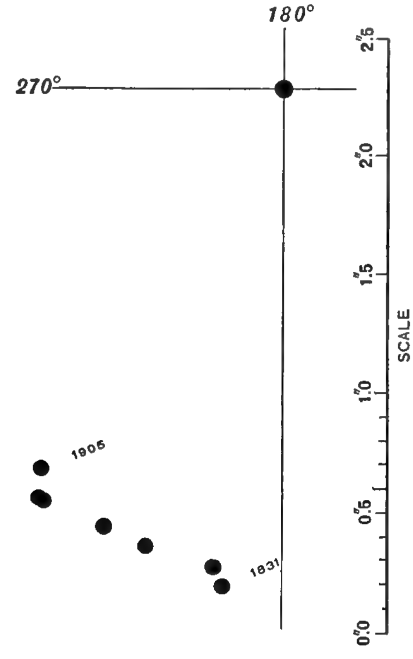
[β4...Com (**VI**)...]

48 30 **9711.** **Σ** 2599. No material change.

1868.45	52°2	3″65	4*n*	Δ
1889.43	51.0	3.95	3*n*	HΣ
1900.60	52.1	3.52	2*n*	A

[Ma (**X, XI, XIII, XV**)...Ma (*F. S.* **I**)...Δ (1207)...Δ (**I, II**)...Glasenapp (**V**)... A (*Bul. L. O.* No, 11)...HΣ (**XII**)...]

48 32 **9712.** **Σ 2596.** *Aquilae* **192.** Apparently rectilinear motion.



Σ 2596.

1831.26	353°1	2″12	4*n*	Σ
1842.71	351.9	2.05	3*n*	Ma
1864.52	343.4	2.02	4*n*	Δ
1877.35	338.0	2.01	1*n*	Δ
1892.78	329.4	2.02	2*n*	Jones
1897.89	329.9	2.02	3*n*	Hu
1905.36	327.8	1.90	3*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Flm...Δ (1573)...Δ (**II**)...Sk2...Sk3...Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13) ... Sp (**II**) ... En (2677)... Jones (*Proc. Haverford Coll. Obsy.* 1892)...Callandreau (*Bul. Ast.* **XII**, 523)...Glasenapp (**III**)....Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....Hu (**A.** *J.* 427).... Solá (3529, 3679) ... Maw (**III**) ... *A. G. Leipzig.* p. 210 ... Furner (*Mon. Not.* **LXVI**, 29)...HΣ (**XII**)...β6...]

9713. ε *Draconis*. **Σ 2603.** (= **♅ I. 8 = Sh 311.**) Slow direct motion in angle, and common proper motion. 48m 34s

Auwers	0″078 in 77°5	
Paris	0.072 in 75.6	

1876.47	1°5	2″90	24*n*	Δ
1877.90	2.0	2.99	13*n*	Hl
1889.66	4.4	3.02	4*n*	Hl
1895.18	2.5	3.06	8*n*	Com
1900.26	5.1	3.07	3*n*	Doo
1905.68	1.9	3.09	3*n*	β

Pritchett measures a pair about ½ m *f*, 263°7 : 3″25 (1880.73) 2*n*; magnitudes not given.

[Ma (*F. S.* **I**)...Ma (**IX, XI**)...H1...Da1...Da3...Bp...Se...Wr...Wr (*Phil. Trans.* 1851)...Ra (**XXI**)...Flm...Ba (**II, IV**)...Du...Pk...Pl...WS...Sk2 ...Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (1125, 1194)...Δ (**I**, pp. 92, 400)... Δ (**II**)... OΣ (**IX, X**)... Je (2449)... Kustner (2584)... En (2662)... Cin4...Cin5...Com (**VI**)...See (*Beob. Berlin*, No. 6, 1892)...Hl (**I**, p. 21; **II**)... Glasenapp (**I, III**)... Maw (**I, IV**)... Collins (*A. J.* 378)... Com (**X**)... Knorre (3300)...Doolittle (*Pub. Flower Obsy.* **I**)...Sk5...β6...]

9714. **A. G. 242.** Double in *A. G. Lund.* Measures by β6. 48 36

9716. **H 1449.** The only measure is: 48 39

1904.72	284°0	7″80	2*n*	Espin	9.0...12.2

[Espin (*Mon. Not.* **LXVI**, 142)...]

9718. **β 659.** Discovered with the 18½-inch. No sensible change. 48 48

1884.58	314°2	12″13	2*n*	HΣ
1891.50	315.6	12.39	5*n*	β
1898.68	314.5	12.47	3*n*	Doo
1899.77	313.7	12.96		Gr. Obsy.

The last position is from a photographic plate.

[β (**X**)...β1...β (3114)(*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I**)... HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LX**, 519)...]

9719. **Σ 2597.** *Aquilae* **191.** Probably fixed, but the measures are not accordant in distance. In 1864 Dembowski suspected an elongation of A in 140°. The components have a common proper motion of 0″124 in 193°9 (Innes). 48 53

1826.47	92°1	1″92	4*n*	Σ
1848.66	86.4	1.40	1*n*	Mh
1856.40	87.9	1.67	3*n*	Se
1867.90	90.6	1.55	4*n*	Δ
1876.42	91.7	1.33	3*n*	Sp
1880.77	88.6	1.23	1*n*	β
1890.54	92.7	1.71	1*n*	Gla
1892.64	90.5	1.68	3*n*	T
1899.72	84.6	1.42	3*n*	Bryant
1903.68	89.1	1.11	2*n*	Biesbroeck

[Ma (*F. S.* **I**)...Ma (**X**)... Mh... **Se**... Se3... Δ (1125)... Δ (**I, II**)... Giacomelli (**III**)...Lv1...β3...Sp (**II**)...Glasenapp (**I, III**)...T (3185)...Solá (3529, 3679) ....Bryant and Furner (*Mon. Not.* **LX**, 512; **LXVI**, 29)....Do (3799)....Maw (**IV**)...Thiele (3837)...Biesbroeck...]

$48^m\ 58^s$ **9720.** **Hn** 153. No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

49 0 **9721.** **β** 830. Discovered with the 15½-inch at the Washburn Observatory. Change uncertain.

1886.80	106°3	2″69	2*n*	Ho
1886.87	105.6	2.90	2*n*	UL
1887.81	106.0	2.81	3*n*	Com
1903.49	100.6	2.88	3*n*	Doo

[β (**XII**)...β^2...Ho (2978)...UL...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

49 15 **9722.** **Schj.** 23. A later measure is:

1905.60	24°8	36″02	1*n*	β

[Schjellerup (1485)...Glasenapp (I)...β^6...]

49 25 **9724.** **β** *Aquilae*. **OΣ** 532. But little change in either angle or distance, but the components have a large common proper motion.

Auwers	0″474 in 177°8
Newcomb	0.482 in 175.7
Bossert	0.470 in 178.2

The relative motion will be seen from the following:

1870.03	17°9	11″95	5*n*	Δ
1879.44	16.0	11.86	7*n*	β
1881.43	17.2	12.25	4*n*	β
1884.63	15.9	12.09	2*n*	Hl
1899.63	14.4	12.52	3*n*	Hu
1904.44	13.6	12.08	3*n*	β

[OΣ (**IX, X**)...OΣ (*Mon. Not.* **XX**, 9)... Mu...Δ (I)...Flm...Hd...Pt...Pk... Sadler (*Ast. Reg.* **XXIII**, 117)....En (2678)....β^1....β^3....β^4....Hl (*Wash. Obsns.* 1884)... Hl (I, II)... Bryant (*Mon. Not.* **LX**, 512; **LXIII**, 403)... Hu (*Pub. L. O.* **V**)...β^6...]

49 28 **9725.** **Ho** 115. Fixed.

1904.69	324°6	5″05	3*n*	Doo

[Ho (2779, 3558)...]

49 53 **9727.** **A** 275. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

50 4 **9729.** **Σ** 2600. Probably unchanged.

1868.45	56°6	2″96	4*n*	Δ
1895.67	58.3	3.33	2*n*	Gla
1902.71	55.3	2.88	3*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Se...Δ (**II**)...Cin^5...Glasenapp (**IV**)...Greenwich Obsy. (*Mon. Not.* **LX**, 512; **LXI**, 486; **LXIII**, 403; **LXIV**, 804; **LXVI**, 29)...]

50 10 **9731.** **H** 2909. "A line of four equidistant stars 11 m, each 5″ from the next." The middle two, and brightest of the four, are 224°4 : 13″0 (1904). In the field *np* the 9.5 m star, DM (38°) 3811.

9732. **OΣ** 390. Without change. $50^m\ 20^s$

A and B

1867.33	24°2	9″48	3*n*	Δ
1898.67	22.8	9.60	3*n*	Hu
1901.53	22.2	9.40	1*n*	β

A and C

1867.62	175°4	16″39	2*n*	Δ
1898.67	174.7	16.37	4*n*	Hu
1901.53	175.5	16.15	1*n*	β

About 12^s *p* and a little *s* is a wide pair of small stars 80° : 30″, the smaller of which is double.

[OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...β^5...]

9736. **Ho** 116. (AC = **H** 2908.) H gave for the distant star, 12°5 : 18″ ± : 8...14 (1830+). No motion. 50 38

AB	1904.69	24°8	3″79	3*n*	Doo	8.3...13.0
AC	1904.69	12.3	18.35	3*n*	Doo	...12.1

[Ho (2779, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9737. **H** 1453. "The *p* star *reddish.*" A faint triple near this place in Cin^5, 252°3 : 301°1 (1879.39); distance not measured. I could not find H 1453 on one occasion in 1905. 50 41

9738. **Σ** 2601. Unchanged. 50 46

1866.32	162°8	6″70	3*n*	Δ
1902.54	161.5	6.85	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**V**)... Se... Hl (*Wash. Obsns.* 1863)... Hl (**I**)... Δ (**II**)...Glasenapp (**V**)...]

9739. **Ho** 581. Recent measures by Doolittle show a large change in the angle. 50 56

1905.70	329°9	0″32	5*n*	Doo	7.4...7.4

[Ho (3557)...]

9741. **Hd** 155. The other star appears to be W^1 XIX. 1258. The positions in Lamont give, 120°5 : 113″0 (1850). 51 22

(See p. 1081)

9744. **OΣ** (App) 194. Relatively fixed. 51 26

1882.95	359°7	75″58	4*n*	Franz
1903.64	359.6	75.37	1*n*	Espin

[Δ (I)...Franz (2649)...Espin (*Mon. Not.* **LXIV**, 678)...]

9745. This is the first measure of Hu 689, with error in the R. A. (See No. 9793.) 51 28

9747. **Σ** 2604. (= **H** N. 120.) Fixed. 51 29

1866.65	184°4	27″91	3*n*	Δ
1902.55	184.4	28.02	4*n*	Hu

[Ma (*F. S.* II)....Δ (II)....Cin^5....Glasenapp (**V**)....Espin (*Mon. Not.* **LXIV**, 677)...]

$51^{m}\,35^{s}$ **9748.** **H 604.** The wide pair measured in this place does not agree in angle with H 604. These stars are DM (40°) 3948 and 3949, and are in the Herschel place.

1905.29	93°.7	70″.55	1*n*	β^6	7.7...9.3

The 5.8 m star, DM (39°) 3968, which is $1^m\,28^s$ *f*, has a distant companion which agrees better with the description in H. The smaller star is DM (39°) 3966. There is a 13 m star much nearer A, 343°: 19″ (1905).

1904.71	317°.5	65″.15	2*n*	Espin	5.5...8.8
1905.29	317.2	64.57	1*n*	β^6	6.0...9.0

51 48 **9752.** *η Cygni.* **β 980.** (ACD = **H 1455.**) The faint companion was detected with the 18½-inch. Auwers gives the proper motion of *η Cygni* as 0″.046 in the direction of 231°.0. This movement would increase the distance of B, if fixed, about 0″.4 in the time covered by the measures. The object is not an easy one to measure, and it is impossible at this time to say whether these stars have the same proper motion. The probabilities are that they form a system. The distant stars, C and D, noted by Herschel, can only be optical companions. All the other measures of these stars are given.

A and B

1887.27	207°.3	7″.44	5*n*	HΣ
1889.51	210.4	7.21	4*n*	β
1898.56	208.2	7.23	2*n*	β
1898.91	209.0	7.70	2*n*	A
1899.71	208.2	7.50	3*n*	Doo
1899.74	214.1	7.54	1*n*	Lewis

A and C (= H 1455)

1828	332°.0	30″ ±	1*n*	H
1889.51	326.2	46.08	2*n*	β
1898.56	326.2	46.00	2*n*	β
1899.71	326.8	46.29	3*n*	Doo

A and D (= H 1455)

1828	170° ±	20″ ±	1*n*	H
1889.51	169.1	49.82	2*n*	β
1898.56	168.0	49.65	2*n*	β
1899.71	.169.2	50.08	3*n*	Doo

[β (**XIII**)...β^3...β (2957)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...HΣ (**XII**)...A (3585)...Lewis (*Mon. Not.* **LX**, 512)...Doolittle (*Pub. Flower Obsy.* **I**)...]

51 59 **9753.** **β 831.** Discovered with the 15½-inch at the Washburn Observatory. Without change.

1888.20	128°.3	0″.92	4*n*	Com
1898.59	128.4	1.08	4*n*	Doo

[β (**XII**)...β^2...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

52 9 **9755.** **A. Clark 12.** Discovered by Alvan Clark with a 7¼-inch refractor in 1854. The measures are very discordant for a pair of this class, and it is not certain there has been any change. The measure in Se^1, credited to this, belongs to an entirely different pair. I have looked for a pair of this description several times, and there is certainly nothing in the immediate vicinity. Secchi's measure is given:

1857.85	282°.7	2″.20	1*n*	Se	9.0...9.5

The following are some of the measures of A. C. 12:

1859.60	335°.0	0″.81	1*n*	Se	
1873.22	332.4	0.93	4*n*	Δ	7.1...8.1
1875.70	328.3	0.96	3*n*	Sp	
1879.02	327.1	1.10	7*n*	Cin	
1880.67	319.8	1.15	2*n*	Sp	
1887.80	321.9	0.9±	1*n*	Sp	
1888.55	323.7	1.18	3*n*	Lv	
1889.56	320.9	1.01	4*n*	T	
1899.73	319.6	1.08	3*n*	A	7.4...8.0
1900.42	320.3	1.33	4*n*	Doo	8.0...8.6

[Da^3...Da (*Mon. Not.* **XVII**, 257)...Se...Se^1...Hd...Δ (**I**)...Cin^5...Cin^6...Wilson (Cin^{10})...Lv^1...LM...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Sp (2133)...Sp (**II, II App**)...T (3186)...A (3639)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9756. **Σ 2602.** (= **H 2907.**) Unchanged. $52^{m}\,14^{s}$

1867.30	148°.4	12″.08	3*n*	Δ
1892.64	147.2	12.05	2*n*	T
1902.54	147.6	12.30	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**). Cin^5...T (3185)...]

9758. **β 266.** Discovered with the 6-inch. No change. 52 15

1892.57	167°.0	15″.94	1*n*	Lv
1898.55	166.4	15.55	3*n*	Doo

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....Δ (**I**)....Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9759. **β 425.** Discovered with the 6-inch. Fixed. Some of the later measures are: 52 15

A and B

1879.55	241°.2	1″.41	3*n*	β
1891.50	242.1	1.30	3*n*	β
1898.58	241.5	1.32	5*n*	Bowyer
1898.66	240.9	1.39	4*n*	Doo
1902.66	241.1	1.52	3*n*	Bowyer

A and C

1879.55	40°.4	19″.81	3*n*	β	...12.0
1898.66	39.5	19.85	4*n*	Doo	...10.9

[β (**VII**)...β (2103, 3114)(*Pub. L. O.* **II**)...β^1...β^3...Δ (**I**)...En (2678)...Doolittle (*Pub. Flower Obsy.* **I**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486; **LXIII**, 403)...]

9761. **A. G. 243.** Double in *A. G. Leiden.* Measures by β^6. 52 24

9765. *ψ Cygni.* **Σ 2605.** (= **H II. 15 = Sh 312.**) No material change. The proper motion is 0″.059 in 233°.8 (Auwers). 52 32

1869.93	182°.6	3″.39	5*n*	Δ
1902.55	181.0	3.50	3*n*	Hu

[Ma (304)...Ma (**IX, XI, XIII**)...Se...Wr...J^2...Da^2...Ra (**XXI**)...Δ (*Mem. Accad. Sci*)....Δ (1022)....Δ (**I, II**)....WS....Gl....Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Pk...Bl (**V**)...T (2898)...Glasenapp (**III**)...]

$52^m\ 40^s$ **9767.** **β 981.** Discovered with the 18½-inch. The other measures are:

A and B

1891.51	109°7	3″32	2*n*	β
1898.55	109.1	2.86	3*n*	Doo

A and C

1898.55	58°5	32″61	3*n*	Doo

[β (**XIII**)...β^3...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

52 41 **9768.** **H 2912.** "Fine star." The only measures are:

1879.46	134°0	17″09	1*n*	Cin	
1890.55	137.2	16.00	2*n*	Gla	9.1...9.8

[Cin^5...Glasenapp (I)...] (See p. 1081)

52 47 **9769.** **β 149.** Distant double companion noted with the 6-inch. The principal star has a very small proper motion of 0″005 in the direction of 324°2 (*A. G. Berlin*).

B and C

1898.64	199°5	8″38	3*n*	A	8.5...11.5
1901.58	200.0	8.52	3*n*	Doo	

A and B

1898.64	278°6	127″75	3*n*	A	7.0...

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59).... Lv (*A. J.* 382).... A (3585).... Doolittle (*Pub. Flower Obsy.* **II**)...]

52 57 **9771.** **A. Clark 16.** (AC = **OΣ (App) 195.**) Without change.

A and B

1873.70	241°5	0″41	2*n*	OΣ	7.8...8.2
1874.38	242.0	0.34	2*n*	Δ	7.5...7.9
1878.68	237.7	0.45	1*n*	β	
1888.65	55.7	0.46	3*n*	Hl	
1897.93	61.9	0.48	3*n*	Hu	
1901.78	237.8	0.44	3*n*	A	8.4...8.5
1902.66	59.0	0.34	3*n*	Bowyer	

[Da (*Mon. Not.* **XVII**, 257)... Da^4... OΣ (**X**)... Δ (**I**)...β^1... Flm...WS^2... Hl (**II**)....Hu (*A. J.* 427)....Franz (3464)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)....Do (3680).... A (*Bul. L. O.* No. 11)...HΣ (**XII**)...]

53 5 **9772.** **A. G. 244.** Double in *A. G. Berlin.*

1904.59	277°3	1″37	4*n*	Gr. Obsy.

[Miller (*A. J.* 546)... Greenwich Obsy. (*Mon. Not.* **LXVI**, 30)...]

53 9 **9773.** **See 400.** Later measures at the Lowell Observatory:

1899.51	29°2	1″53	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

53 16 **9774.** **Ho 276.** Described by Ho as elongated in 1887. Apparently single on 2*n* with the 36-inch in 1890. No other observations. This star has a large proper motion:

Stumpe	0″507	in	221°8
Porter	0.498	in	221.4
Paris	0.485	in	216.4

[Ho (2977)...β (3048)(*Pub. L. O.* **II**)...]

9775. **OΣ 391** *rej.* (= **H 1456.**) Fixed. Rejected in last edition of *Poulkowa Catalogue.* $53^m\ 20^s$

1898.66	52°1	18″28	3*n*	Hu

[Ma (**XI**)...Bl (**V**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

9776. **H 1457.** Double in *A. G. Lund.* 53 23

1900.57	44°2	11″58	1*n*	Es	9.1...9.2

[Espin (*Mon. Not.* **LXIV**, 679)...]

9777. **H 5164.** "Double" in O. Arg. S. and *Cordoba Zones.* 53 31

1878.71	122°5	9″15	3*n*	Cin	8.2...8.8

[Cin^4...Cin^5...Cin^6...]

9779. **Ho 582.** No other measures. In 1905 Doolittle found the elongation doubtful. 53 40

[Ho (3557)...] (See p. 1082)

9780. **Ho 583.** Probably fixed. 53 52

1904.50	254°2	1″22	4*n*	Doo

[Ho (3557)...Greenwich Obsy. (*Mon. Not.* **LXVI**, 30)...]

9781. **Σ 2617.** Fixed. 53 53

1866.56	41°6	27″96	3*n*	Δ
1902.57	41.0	27.92	2*n*	Hu

[Ma (*F. S.* **II**)...Δ (**II**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (**III**)...]

9782 **OΣ 392.** (AC = **Σ 2607.**) *Cygni* **116.** No change in the Σ star. There may be some diminution in the angle and distance of the close pair, but the motion, if any, is very slow. 53 54

A and B

1843.83	324°3	0″2 ±	2*n*	Ma
1844.66	322.0	0.44	3*n*	OΣ
1855.64	317.1	0.43	4*n*	OΣ
1870.20	300.9	Cun.	6*n*	Δ
1878.53	317.0	0.31	1*n*	β
1879.20	306.1	0.4 ±	2*n*	Sp
1879.69	311.4	0.36	2*n*	Hl
1883.61	310.6	0.45	2*n*	Per
1889.66	305.9	0.36	2*n*	Hl
1890.68	306.2	0.29	3*n*	β
1898.70	306.3	0.32	3*n*	Hu
1904.51	305.4	0.33	1*n*	Lewis

AB and C (= Σ 2607)

1869.45	291°8	3″08	6*n*	Δ
1889.86	291.7	3.14	4*n*	Sp
1890.68	291.5	3.16	3*n*	β
1900.28	290.1	3.36	5*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H^1... OΣ (**IX**)...Wr... Se... Da^2...Bl (**V**)... Δ (**II**)... Flm... Do (2322)...Sp (**II**)...Per...Per (2559)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...β^1...β (3048)(*Pub. L. O.* **II**)...Glasenapp (**III**)...Collins (*A. J.* 378).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXI**, 486; **LXVI**, 30)...Hu(*Pub. L. O.* **V**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

(See p. 1082)

53^m 54^s **9783.** **Σ 2606.** Unchanged.

1868.42	132°7	1″13	4*n*	Δ
1875.70	134.4	1.04	1*n*	Sp
1902.55	132.5	1.18	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X**)... Se... Da^3... OΣ (**IX**)... Du... Δ (1125)... Δ (**I, II**)... Per.... UL.... Sp (**II**).... Glasenapp (**III**).... Maw (**IV**).... Lewis (*Mon. Not.* **LXVI**, 30)...]

53 55 **9784.** **Schj. 24.** The only measures are:

1904.53	6°0	36″81	2*n*	β	9.2...10.0

[Schjellerup (1485)... β^6...]

54 : **9785.** **Lewis 31.** The places given in the two references differ in R. A. and declination, 2^m and 3′ respectively.

1901.63	130°0	3″40	2*n*	Lewis	9.2...9.8

[Lewis (*Mon. Not.* **LX**, 512; **LXII**, 396)...]

54 0 **9786.** **OΣ 393.** There may be a little change in the distance from proper motion.

1843.84	235°3	22″19	1*n*	Ma
1847.74	225.8	21.75	3*n*	OΣ
1868.32	226.2	21.14	4*n*	Δ
1883.68	226.6	20.75	3*n*	Per
1883.73	227.5	20.63	6*n*	En
1898.66	227.5	20.27	3*n*	Hu
1901.93	227.8	20.02	3*n*	Doo
1903.58	227.6	20.09	2*n*	Do

[Ma (**XI**)... OΣ (**IX**)... Δ (**I**)... Du... Per... Per (2560)... En (2678)... Sk^2... Hu (*Pub. L. O.* **V**)... HΣ (**XII**)... Do (3931)... Doolittle (*Pub. Flower Obsy.* **II**)...]
(See p. 1082)

54 15 **9787.** **Σ 2609.** *Cygni* **118.** Fixed.

1868.38	26°6	2″11	4*n*	Δ
1896.74	26.6	2.14	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H^1... Da^2... Se... Wr... Ra (**XXVIII**)... Δ (1125)... Δ (**I, II**)... T (2898)... Glasenapp (**III**)... Hu (*A. J.* 397)... ***Annals Toulouse Obsy.*** **III**... Espin (*Mon. Not.* **LXII**, 530)...]

54 16 **9788.** **See 401.** In 1899 Cogshall examined this carefully on three nights with favorable conditions without seeing any trace of the companion, and doubts its existence. The proper motion of this star is 0″165 in 268°2 (Hedrick).

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

54 22 **9789.** **H 1458.** The companion is DM (10°) 4133. No change.

1875.11	133°7	16″04	2*n*	Δ	8.5...8.5
1901.47	133.5	16.30	3*n*	β	8.8...8.8

[Δ (**I**)... β^5...]

54 26 **9791.** **A 276.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

9792. **β 469.** Discovered with the 6-inch. Fixed. 54^m 28^s

1891.50	177°3	14″34	3*n*	β
1904.46	177.3	14.47	3*n*	Doo
1905.64	179.1	14.39	1*n*	β

[β (**IX**)... β (*Mon. Not.* **XXXVIII**, 78)... β (3114) (*Pub. L. O.* **II**)... Δ (**I**)... Doolittle (*Pub. Flower Obsy.* **II**)... β^6...]

9793. **Hu 689.** No other measures. 54 28

[Hu (*Bul. L. O.* No. 57)...]

9794. **H 2919.** "A third 13m nearly in line, and a fourth 9m distant." 54 32

9796. **Σ 2610.** (= **S 729.**) No change in AB. The faint star C is not in Σ; given as new by Δ, but it had been seen previously by Ma and Wr. A third star in Glasenapp, 15°1: 62″13 (1894.69) 1*n*. 54 38

A and B

1865.55	296°2	4″24	3*n*	Δ
1882.62	293.6	4.16	1*n*	OΣ
1904.45	297.2	4.24	1*n*	β

A and C

1865.67	203°3	12″47	3*n*	Δ	...11.6
1882.62	203.0	13.02	1*n*	OΣ	...10.0
1904.46	201.7	12.58	2*n*	β	...10.9

[Ma (*F. S.* **I**)... Ma (**XI**)... Wr... Δ (1736)... Δ (**II**)... OΣ (**X**)... Glasenapp (**III**) ***Annals Toulouse Obsy.*** **III**... β^6...]

9797. χ (13) *Sagittae.* H IV. 100 is erroneously called χ *Sagittae* by Herschel. That pair is in the field, 114″ distant from χ *Sagittae* (see No. 9800). The large star has a proper motion of 0″022 in 239°4 (Auwers). 54 38

The only other measure is the following:

1904.47	207°4	28″77	3*n*	β	...13.2

[β^1... β^6...]

9799. **S 730.** Two nearer stars measured in Cin^5. 54 44

A and B

1879.54	197°9	39″80	1*n*	Cin	7.0... 8.0
1904.40	198.6	39.93	2*n*	β	8.0...10.7

A and C

1879.54	338°2	80″37	1*n*	Cin	... 8.5
1904.40	338.4	79.50	2*n*	β	...10.3

A and D

1879.54	14°8	115″91	1*n*	Cin	... 9.0
1904.40	15.5	114.70	2*n*	β	... 8.7

[Cin^5... β^6...]

9800. **H IV. 100.** (= **Σ 2608** *rej.*) Erroneously called χ *Sagittae* in H. That star is C of the Herschel observation (see No. 9797). The only measures since 1783 are the following: 54 45

A and B

1904.40	256°0	23″75	2*n*	β^6	8.6...8.6

A and χ *Sagittae*

1904.43	297°3	114″30	1*n*	β^6	Single dist.

54^m 56^s **9801.** **β 1133.** Discovered with the 36-inch. The other measures show no change.

1897.79	335°3	0″93	3*n*	A
1898.69	338.0	0.72	4*n*	Lewis
1899.25	338.0	0.66	2*n*	Bowyer

[β (**XVI**)....β (2956)(*Pub. L. O.* **II**)....A (*A. J.* 429)....Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 512)...]

54 58 **9804.** **H 2918.** The following are the only measures:

1879.22	134°4	16″69	3*n*	Cin	9.0...9.7
1882.64	136.2	16.90	1*n*	Wilson	8.5...9.0

[Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})...]

55 5 **9805.** **H 1462.** The only measure is:

1905.70	23°1	33″29	1*n*	β^6	8.2...10.0

55 6 **9806.** **Arg. 35.** "Duplex" in O. Arg. N. The principal star is given a proper motion of 0″088 in 0° (*A. G. Harvard*).

1902.46	228°0	7″27	2*n*	β^6	8.4...9.0

55 8 **9807.** **A 169.** This is *nf* the dumb-bell nebula. No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

55 14 **9808.** **Σ 2611.** (= **S** 731.) Unchanged.

1865.91	26°8	5″23	3*n*	Δ
1902.55	26.7	5.21	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se...Δ (1209)...Δ (**I, II**)...Glasenapp (**IV**)...Espin (*Mon. Not.* **LXIV**, 677)...]

55 15 **9809.** **Ho 584.** No motion.

1904.47	226°8	2″52	3*n*	Doo

[Ho (3557)...]

55 25 **9810.** Double in *Harvard Zones.* Measures from β^6.

55 26 **9811.** **β 1258.** Discovered with the 18½-inch, and at first measured for β 439.

1891.49	157°4	1″45	3*n*	β
1897.79	153.9	1.56	3*n*	A
1901.05	157.3	1.42	5*n*	Lewis
1901.61	157.5	1.57	3*n*	Doo
1903.17	151.6	1.81	2*n*	A
1903.47	156.0	1.65	2*n*	β

[β (**XVIII**)....β (3113)....β^1....β (*Pub. L. O.* **II**)....A (*A. J.* 429)....Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 512; **LXII**, 383; **LXIII**, 403)....Doolittle (*Pub. Flower Obsy.* **II**)...]

9813. **𝕳 I. 93.** Small error in 𝕳's place. A fine pair, and wholly neglected until the attention of Dembowski was called to it. The measures show no apparent change. 55^m 30^s

1802.75	283°3	....	1*n*	𝕳	
1876.68	293.8	2″11	4*n*	Δ	7.8...8.4
1901.19	296.4	2.08	4*n*	β	8.0...8.6
1903.66	295.2	1.97	5*n*	Jouffray	
1903.67	294.4	2.12	4*n*	Doo	

[Δ (**I**)....Doolittle (*Pub. Flower Obsy.* **I, II**)....Scott (*Mon. Not.* **LXIV**, 52)....Jouffray (*Bul. Ast.* **XXI**, 299)...β^5...]

9814. **Σ 2612.** Change in distance, and probably rectilinear motion. The measure by Perrotin called Σ^1 2612 belongs to 3 *Pegasi* (Σ 56, App. I), which is No. 2612 of *Pos. Med.* 55 31

1827.67	52°8	36″59	3*n*	Σ
1847.69	53.4	36.62	1*n*	Ma
1863.67	53.1	38.18	1*n*	Hl
1865.41	53.1	37.80	3*n*	Δ
1878.46	53.3	38.03	1*n*	β
1880.69	52.5	38.35	1*n*	Pt
1892.85	52.6	38.32	2*n*	Gla
1901.48	53.5	38.90	3*n*	β

There is a faint pair of 12.5 m stars about 30″ from B.

[Ma (*F. S.* **II**)...H (**V**)...Δ (1573)...Δ (**II**)...Flm...Pt...β^1...Glasenapp (**II**)...Hl (**I**, p. 135)...β^6...]

9816. **H 2923.** This star has no companion in the angle given by H. Other faint stars in the field, but nothing else as near as the one measured: 55 38

1905.74	246°5	29″89	1*n*	β^6	8.0...13.5

9818. **Σ 2613.** *Aquilae* 210. No sensible motion. 55 43

1866.31	349°4	4″43	3*n*	Δ
1886.31	349.7	4.54	6*n*	Per
1902.55	350.6	4.53	3*n*	Hu
1905.78	351.7	4.19	1*n*	β

[Ma (*F. S.* **I**)....Ma (**IX, XIII, XV**)....H^1....Wr....Bp....Se....Ra (**XXIII**)....Δ (*Mem. Accad. Sci.*)...Δ (1032)...Ferr...Du...Δ (**I, II**)...Per...Per (2749)...Ba (**II**)...Hl (**I**, p. 135)...Glasenapp (**I, II, III**)...*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...β^6...]

9820. **OΣ 394.** Fixed. 55 45

1866.89	294°4	10″68	3*n*	Δ
1885.13	294.6	10.94	6*n*	Per
1898.66	296.4	11.07	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Per...Per (2560)...Hu (*Pub. L. O.* **V**)...]

9821. **H 1464.** "Small star requires power of 240 to be seen." Examined with the 18½-inch (1876) and found as described by H. There is an error of 5′ in the declination of this star in L 38300. The only measures are of recent date: 55 48

1902.46	32°2	13″39	2*n*	β^6	8.1...12.7

9823. **β 439.** Discovered with the 18½-inch. The measure in β^1, credited to this pair, belongs to a new pair in the field *np* (β 1258). 55 57

All the later measures are given:

1891.50	248°2	3″05	3*n*	β
1900.92	238.6	3.25	4*n*	Lewis
1901.62	240.1	3.12	4*n*	Doo
1903.17	240.4	3.20	2*n*	A
1903.48	245.5	3.45	3*n*	β

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)...β (3114)(*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400; **LXII**, 383; **LXIII**, 403)....Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...β^6...]

56^m · • **9824.** **Lewis 32.** A pair of small stars *nf* β 439. The measures are very discordant.

1899.72	129°7	3″70	1*n*	Lewis	9.0... 9.5
1901.63	130.0	3.40	2*n*	Lewis	9.2... 9.8
1902.67	303.7	2.77	1*n*	Lewis	8.5... 9.0
1903.47	128.7	3.11	2*n*	β	10.5...10.7

[Lewis (*Mon. Not.* **LX**, 512; **LXII**, 396; **LXIII**, 414)...β^6...]

56 21 **9826.** **Ho 585.** Fixed.

1904.72	358°0	15″66	3*n*	Doo

[Ho (3557)...]

56 33 **9828.** **A 719.** No other measures.

[A (*Bul. L. O.* No. 61)...]

56 34 **9829.** **H 2921.** Nothing but this since H:

1905.62	338°2	21″50	1*n*	β^6	8.8...11.0

56 38 **9830.** **β 1289.** The close pair was discovered with the 18½-inch July 13, 1880, but forgotten at the time, and only found upon a recent examination of the old observing records of twenty years ago. The distance at that time was estimated 1″5. C is W^2 XIX. 1838. The only measures since my own are:

AB	1903.60	54°0	0″86	3*n*	Doo
AC	1903.25	89.7	21.69	3*n*	Doo

[β (*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

56 51 **9832.** **A 277.** No other measures.

[A (3784) (*Bul. L. O.* No. 16)...]

56 56 **9833.** 16 *Vulpeculae.* **OΣ 395.** The angle appears to be slowly increasing, but the motion is very slow. The early measures are discordant. The proper motion is 0″092 in 48°8 (Auwers).

Some of the positions at short intervals during the last sixty years are:

1843.53	89°2	0″5±	2*n*	Ma
1845.79	67.4	0.45±	1*n*	Ma
1847.73	74.2	0.45±	1*n*	Ma
1851.71	78.2	0.40	1*n*	Ma
1852.60	80.6	0.57	2*n*	Da
1852.84	91.0	0.6±	1*n*	Ma
1869.37	88°8	0″66	7*n*	*Δ*
1875.63	92.7	0.7±	4*n*	Sp
1880.05	93.4	0.84	2*n*	β
1883.67	95.3	0.69	3*n*	Per
1887.79	97.7	0.59	4*n*	Sp
1888.65	100.2	0.60	3*n*	Hl
1893.67	100.5	0.56	2*n*	Gla
1894.78	97.9	0.76	4*n*	Big
1898.67	100.2	0.69	4*n*	Hu
1904.58	99.8	0.64	3*n*	Bowyer

[Ma (**XI, XIII**)...OΣ (**IX**)...Da^3...Se...Flm...Sk^2...Perry (*Eng. Mech.* **XXXV**, 65)... Du... Newcomb (*Wash. Obsns.* 1874)... *Δ* (**I**)... *Δ* (1116)... Hl (**II**)... En (1674, 2678)... Per... Per (2560) ... β^3 ... Kustner (2584) ... T (2899) ... Sp (2133)...Sp (**II, II** App.)...Glasenapp (**III**)... Big... Big (*Bul. Ast.* **XII**, 299) ....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)...Do (2322, 3466, 3680)... Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Maw (**IV**)...Biesbroeck...]

9834. **Σ 2615.** The change is due to proper motion. 57^m 5^s

1828.94	323°2	10″82	4*n*	Σ
1868.12	320.2	10.35	4*n*	*Δ*
1878.54	318.4	10.60	2*n*	β
1896.48	317.2	10.25	3*n*	Lv
1902.55	315.8	10.17	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V, VII**)...Ferguson (*Wash. Obsns.* 1863)...*Δ* (**II**) ...β^1...Lv (*A. J.* 407)...Soulé (*A. J.* 410)...Glasenapp (**V**)...]

(See p. 1082)

9835. **Hd Zones.** Double in the *Harvard Zones.* Measures by β^5. 57 6

9836. **A. G. 245.** Double in *A. G. Leiden.* Measures by β^6. 57 9

9837. **Σ 2616.** No sensible motion. 57 13

1866.95	263°6	3″29	3*n*	*Δ*
1902.58	265.0	3.42	2*n*	Hu
1903.18	265.6	3.57	4*n*	Bowyer

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....H (**IV**)....Se...OΣ (**IX**)....*Δ* (**II**)....UL.... Glasenapp (**III**)...Bowyer (*Mon. Not.* **LX**, 512; **LXII**, 383; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)...]

9839. **H 1468.** (= **Da 11.**) Probably fixed. 57 18

1874.67	279°0	13″14	1*n*	OΣ	8.0...9.0
1879.43	278.3	13.07	1*n*	Cin	7.0...8.5
1905.60	279.0	12.77	1*n*	β	

[Da (*Mon. Not.* **XXIV**, 117)...Hd...Cin^5...OΣ (**X**)...β^6...]

9840. **Σ 2623.** Fixed. 57 20

1869.00	105°8	1″68	4*n*	*Δ*
1905.72	105.4	1.64	1*n*	β

[Ma (*F. S.* **I**)...*Δ* (**II**)...β^6...]

9843. Discovered by Espin. 57 21

1905.72	144°6	3″70	2*n*	β	8.6...11.1

[Espin (*Mon. Not.* **LXIV**, 238)...β^6...]

57^m 29^s **9845.** **Σ 2619.** No change in AB. The faint stars, C and D, are not in Σ. C was first noted by H (IV), and D was added by OΣ in 1854. The measure of AB by Ma (XI) probably belongs to Σ 2618.

A and B

1865.93	244°9	4″17	3*n*	Δ
1901.87	243.4	4.20	2*n*	β

A and C

1828+	280° ±	12″ ±	1*n*	H
1854.69	296.6	17.79	1*n*	OΣ
1870.92	302.7	16.88	1*n*	OΣ
1878.94	295.0	18.47	2*n*	β
1901.69	304.3	17.50	3*n*	β

C and D

1901.87	180°6	5″55	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H (**IV**)...Wr...Ra (**XXIV**)...OΣ (**IX**)...Δ (**I, II**)...Se...Du...β^1...β^3...Espin (*Mon. Not.* **LXII**, 530)...β^6...]

57 32 **9847.** Δ **21.** Discovered by Dembowski in 1865. Near Σ 2618. Unchanged.

1900.69	214°6	21″61	1*n*	β

[Δ (1736)...Δ (I)...*A. G. Leipzig*, p. 211...β^6...]

57 39 **9849.** **A 720.** Later measures (*Bul. L. O.* No. 61), the mean being:

1904.47	63°6	0″43	3*n*	A	9.3...9.3

57 42 **9850.** **OΣ (App) 196.** B is Rad^1. 4561. Error of 5′ declination in Lalande 38362. The proper motion is 0″037 in 82°2 (Battermann).

1887.12	167°1	55″75	4*n*	Franz
1905.62	167.6	55.13	2*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

57 53 **9851.** **OΣ 396** *rej.* Rejected in second edition of *Poulkowa Catalogue.* No measure of distance by Ma. Fixed.

1898.67	205°9	47″44	3*n*	Hu

[Ma (**XI**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

57 56 **9852.** **Σ 2618.** Fixed.

1867.08	115°5	5″46	3*n*	Δ
1902.58	115.0	5.61	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Se... Δ (1736)... Δ (**II**)... Glasenapp (**III**)... *A. G. Leipzig*, p. 211...]

57 56 **9853.** **Ho 117.** No change.

1901.75	312°3	5″19	4*n*	Doo

[Ho (2779, 3558)...]

9854. 26 *Cygni.* **H̥ V. 47.** (= σ 655 = **H̥ VI. 60** = **OΣ (App) 197**. No measures by H̥. The faint star C added with the 18½-inch, and the fainter star D with the 40-inch. 57^m 58^s

A and B

1875.32	146°3	41″73	3*n*	Δ
1878.41	146.8	41.76	1*n*	β
1887.32	146.4	41.20	4*n*	Franz
1898.50	147.1	41.96	3*n*	β

B and C

1898.49	74°8	9″02	2*n*	β	...12.2

B and D

1898.49	257°5	10″10	2*n*	β	...13.7

The proper motion is 0″020 in 92°8 (Auwers).

[Δ (I)...β^1...Pk...Franz (3080)...β^6...]

9855. **Lewis 33.** From *Mon. Not.* LXI, 498. Place approximate. 58 :

9856. **Ho 118.** Nothing later but the following: 58 7

1895.23	27°6	2″66	2*n*	Ho

[Ho (2779, 3558)...]

9857. **H 2925.** In W^1 9 m. No motion. 58 11

1879.46	240°7	31″39	1*n*	Cin^5	8.0...11.5
1905.62	241.7	31.63	1*n*	β^6	8.2...11.0

9860. Taken for OΣ 397 *rej.* No other measures. 58 17

[β^6...]

9861. 64 *Sagittarii.* **H̥ IV. 3.** Examined with the 40-inch; only two distant stars nearly *p*. Nothing else found. 58 28

9862. **Σ 2620.** No change since Struve. 58 29

1866.75	290°1	1″89	3*n*	Δ
1883.69	292.3	1.83	1*n*	Ho
1901.54	288.2	1.76	8*n*	Bowyer
1902.59	290.7	1.97	3*n*	Hu

[Ma (*F. S.* I)...Ma (**X**)...Se... Δ (**II**)... Ho (2978)... Glasenapp (**III**)...Bowyer (*Mon. Not.* **LX**, 512; **LXII**, 383; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)...]

9863. **Σ 2622.** (= **H̥ II. 91.**) Fixed. 58 42

1865.62	193°4	5″96	3*n*	Δ
1892.83	195.5	5.79	2*n*	Gla
1905.76	193.3	5.97	1*n*	β

A distant star in H̥:

1893.74	307°0	17″51	2*n*	Gla

[Ma (*F. S.* I)....Ma (**XI, XIII**)....Wr....Se....Δ (**II**)....Glasenapp (**II, III**).... *Annals Toulouse Obsy.* **III**...β^6...]

58m 47s **9864. β 56.** Discovered with the 6-inch. Some of the later measures are:

1879.26	164°3	1″57	3*n*	Cin
1886.73	165.0	1.65	3*n*	LM
1896.52	165.7	1.55	3*n*	Lv
1898.63	166.1	1.55	3*n*	Bd
1901.59	165.8	1.62	3*n*	Doo

[β (I)... β (*Mon. Not.* **XXXIII**, 351) ... Δ (I) ... Cin5 ... LM ... Lv1 ... Lv (*A. J.* 407)... Glasenapp (II)... Boothroyd and Cogshall (*A. J.* 478)... Doolittle (*Pub. Flower Obsy.* **II**)...]

58 48 **9865. Σ 2621.** Unchanged.

1866.63	223°9	5″59	3*n*	Δ
1885.81	223.1	5.75	6*n*	Per
1902.55	223.8	5.66	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H1... Bp... Se... H (**V**)... Du... Ba (**II**)... Δ (1209)... Δ (I, **II**)... Ra (**XXIII**)... Cin5... O. Stone (2201)... LM... Per... Per (2749)... Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**...]

58 56 **9867. Hn 154.** Fixed.

1900.38	41°2	1″29	3*n*	Doo

[Hn (*Pub. Washburn Obsy.* **II**) ... Com (**VI**)... Doolittle (*Pub. Flower Obsy.* **I**) ... Hu (*Bul. L. O.* No. 44)...]

59 1 **9868. Σ 2624.** (= **H I. 96 = Sh 313.**) Fixed.

A and B

1868.70	175°5	1″91	4*n*	Δ
1886.56	176.5	1.95	2*n*	Per
1902.55	176.3	1.94	2*n*	Hu

A and C

1866.75	327°5	42″26	3*n*	Δ
1886.56	327.8	42.48	2*n*	Per
1902.55	327.5	42.31	2*n*	Hu

[Ma (*F. S.* **I**) ... Ma (**XI**) ... Ma (324) ... Se ... Se2... OΣ (**IX, X**) ... Δ (1194)... Δ (I, **II**)... Ra (**XXVIII**)... Flm... WS ... WS2... Gl... Du... Do (2316)... Per .... Per (2559).... Glasenapp (**III**).... Collins (*A. J.* 378).... Knorre (3300).... Greenwich Obsy. (*Mon. Not.* **LX**, 512; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)... *Annals Toulouse Obsy.* **III**...]

59 13 **9871. H 2927.** The 40-inch shows a new companion.

AB	1879.46	126°9	.....	1*n*	Cin5	7.0...12.5
	1901.47	125.0	24″34	3*n*	β5	7.5...12.0
BC	1901.47	185.3	4.84	3*n*	β5	...13.2

59 13 **9872–3. β 426 and β 427.** The two pairs, forming a wide quadruple group, were discovered with the 6-inch. All are probably relatively fixed. C is O. Arg. N. 19952. The later measures are given:

A and B (= β 426)

1884.49	311°5	6″02	6*n*	En
1893.49	310.1	5.71	3*n*	Lv
1898.48	308.8	5.78	3*n*	Doo

C and D (= β 427)

1884.49	337°3	3″18	6*n*	En
1893.49	335.7	2.93	3*n*	Lv
1898.48	333.8	2.90	3*n*	Doo

A and C

1884.78	53°4	165″99	2*n*	En
1898.48	53.2	165.64	3*n*	Doo

[β (**VII**).... β (2103).... Δ (I).... En (2742).... Lv (*A. J.* 382).... Doolittle (*Pub. Flower Obsy.* **I**)...]

9874. See 405. Later measures at the Lowell Observatory: 59m 15s

1899.65	232°1	0″51	3*n*	Cg	8.3...8.7

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

9875. OΣ 397 *rej.* (= **H V. 105.**) The motion is evidently rectilinear, and very slow. The distance in H is much too large. 59 17

1783.26	164°2	38″60	1*n*	H
1845.34	169.5	34.03	2*n*	OΣ
1849.76	169.4	34.30	1*n*	OΣ
1866.91	170.5	35.63	3*n*	Δ
1874.72	171.6	36.02	1*n*	OΣ
1898.67	172.9	37.60	3*n*	Hu
1900.66	173.2	37.78	2*n*	β

The measures since H give 0″081 in 26°1 for the proper motion of A.

[Δ (I)... OΣ (**X**)... Hu (*Pub. L. O.* **V**)... β5...]

9876. H 1470. (= **H 605.**) *Ruddy yellow : contrasted green.* The declination of H 605 is uncertain in H (38° to 40°), but there is no doubt of its identity with H 1470. The description is, 340° : 20″ : 9...12; *dark red : purple.* Called "nova" in Se1, 335°2 : 23″83 : 7...8 (1856.63) 1*n*; "colori superbi." Magnitudes in DM, 7.2...9.4. There is a misprint in the distance of Secchi. 59 19

1892.88	336°0	28″42	2*n*	Espin	
1902.02	337.2	29.06	2*n*	β	7.0...9.1

[Se1... Espin (3717)(*Brit. Ast. Ass'n* **III**, 228)... β5, p. 56...]

9877. Σ 2626. Without change. On two nights in 1840, OΣ measured another pair for Σ 2626. The two measures gave, 245°1 : 1″18 : 7-8...9 (1840.84). In 1876 Dembowski looked for this without success, and I have carefully examined the vicinity of Σ 2626, without finding any other pair. If we assume an error of 1h R. A. in setting the instrument or otherwise, the measures will fit Σ 2465. 59 27

1868.73	123°3	1″02	4*n*	Δ
1884.89	123.7	1.27	7*n*	Per
1902.64	123.4	1.23	1*n*	Hu
1903.56	124.4	1.08	3*n*	Do
1905.45	123.8	1.15	4*n*	Doo

[Ma (*F. S.* **I**)... Ma (**X, XIII, XV**)... Se... Da3... OΣ (**IX**)... Δ (1209)... Δ (**I, II**) ... Flm... Du... Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)... WS... WS2... Sp (**II**)... Per... Per (2559)... Collins (*Proc. Haverford Coll. Obsy.* 1891)... Glasenapp (**III**)... Big (*Bul. Ast.* **XII**, 299)... Callandreau (*Bul. Ast.* **XII**, 523)... Bowyer (*Mon. Not.* **LXVI**, 30)...]

9878. Hn 155. No later measures. 59 43

[Hn (*Pub. Washburn Obsy.* **II**)... Com (**VI**)...]

59m 49s **9879.** **Hu 759.** With later measures the mean is:

1903.89	301°.7	0".47	4*n*	Hu	9.0...11.5

[Hu (*Bul. L. O.* No. 65)...]

59 51 **9880.** **H 1472.** The only measure is this:

1905.64	43°.0	15".87	1*n*	β6	9.5...9.5

59 51 **9881.** **Ho 454.** Unchanged.

1904.71	57°.7	5".69	3*n*	Doo

[Ho (3234)...]

59 54 **9882.** **H 1471.** Nothing since H but the following:

1904.63	4°.4	29".18	3*n*	Espin	5.9...11.5

[Espin (*Mon. Not.* **LXVI**, 142)...]

59 54 **9883.** **Espin 85.** Discovered by Espin. The 40-inch shows a 12 m star, 312°.1 : 11".8.

AB	1905.64	35°.9	2".45	1*n*	β	10.0...10.3
AC	1905.64	86.4	10.38	1*n*	β	...11.5

[Espin (3784)...β6...]

59 55 **9884.** **β 57.** Discovered with the 6-inch. Without change. The magnitude in DM is 6.0; Harvard, 6.5.

1876.60	120°.7	2".09	1*n*	OΣ
1884.31	121.8	2.53	3*n*	HΣ
1891.50	118.3	2.60	3*n*	β
1901.20	118.8	2.37	2*n*	Lewis
1901.60	121.5	2.50	3*n*	Doo
1904.87	122.4	2.12	1*n*	Lewis

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β1...β (3114) (*Pub. L. O.* **II**)...Δ (**I**)... OΣ (**X**)...HΣ (**XII**)...Lewis (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXVI**, 30)... Doolittle (*Pub. Flower Obsy.* **II**)...]

59 56 **9885.** **H 5168.** "A third star 12 m follows:"

1877.66	81°.0	18".80	1*n*	Cin	6.5...10.5
1902.55	79.9	18.8	1*n*	Innes	

[Cin4...Innes (*Mon. Not.* **LXIII**, 76)...]

0 3 **9888.** **Hn 156.** No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

0 5 **9890.** **β 832.** Discovered with the 15½-inch at the Washburn Observatory. The measures show no change.

1886.87	104°.0	1".36	2*n*	UL
1887.79	103.3	1.49	3*n*	Com
1888.51	100.2	1.34	1*n*	Lv
1898.68	104.2	1.80	3*n*	Cogshall
1901.67	101.5	1.55	3*n*	Doo

[β (**XII**)...β2...LM...UL...Lv1...Com (**VI**)...Cogshall (*A. J.* 478)... Doolittle (*Pub. Flower Obsy.* **II**)...]

9891. **Σ 2625.** (= H III. 63.) Fixed. 0m 5s

1866.38	12°.8	12".85	3*n*	Δ
1892.76	12.4	12.75	2*n*	T
1902.56	9.8	13.02	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Bp...Da3...Ba (**II**)...Δ (**II**)...T (3185)...]

9892. 64 *Draconis.* **H VI. 38** This appears to be a 0 12
10 m star in 160°. There is a small star a little nearer on the *f* side (1876). Recently observed with the 40-inch, which shows other small stars nearer than that measured. The principal star has a proper motion of 0".026 in 212°.9 (*A. G. Hels.*).

1905.34	172°.2	193".80	1*n*	β6

9894. **OΣ (App) 198.** No change. With the 18½-inch 0 17
I noticed a minute star between the components.

AB	1901.66	186°.1	65".10	3*n*	β
A*a*	1901.63	173.9	37.29	2*n*	β

[Δ (**I**)...Schur (2255)...β5...]

9896. **See 406.** Unchanged. 0 23

1898.98	4°.5	2".58	3*n*	Boothroyd
1900.38	2.9	2.46	3*n*	Doo

[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9902. **HΣ.** From HΣ (XII). No other measures. 0 47
(See p. 1082)

9903. **H 1479.** This is given by Espin in a list of stars 0 47
with "remarkable spectra" (*A. N.* 2883). The principal star is decidedly reddish.

1902.49	2°.3	33".78	2*n*	β6	7.7...10.0

9905. **H 1477.** The only measure is: 0 55

1901.62	271°.0	20".04	2*n*	β5	8.0...10.6

9907. **OΣ (App) 200.** The proper motion of A is 0".025 1 1
in 94°.5 (*A. G. Hels.*).

AB	1905.82	336°.6	96".84	2*n*	β	
A*a*	1905.75	191.7	26.74	1*n*	β	...12.0

[Δ (**I**)...Franz (2649)...β6...]

9908. **β 428.** Discovered with the 6-inch. Probably 1 5
unchanged.

1878.58	353°.2	1".04	1*n*	OΣ
1885.52	355.5	0.60	2*n*	HΣ
1893.72	350.2	0.68	3*n*	Wilson
1898.91	352.7	0.69	5*n*	Do

[β (**VII**)...β (2103)...Δ (**I**)...OΣ (**X**)...HΣ (**XII**)...Lv (*A. J.* 278)(*Proc. Haverford Coll. Obsy.* 1892)...Wilson (   )...Do (3466, 3680)...]

$1^m\ 8^s$ **9909.** **Sh 316.** (= **OΣ (App) 199.**) No change. Espin notes two small stars near B (= Espin 24).

AB	1876.03	323°5	69″37	3*n*	Δ	7.2... 8.2
	1905.75	323.0	69.55	1*n*	β	
B*a*	1900.70	243.7	11.80	1*n*	Es	...14
B*b*	1900.70	83.0	16.08	1*n*	Es	...13
	1905.75	85.3	16.84	1*n*	β	...13

[Δ (I)...Franz (3080)...Espin (3717)...β^6...]

1 17 **9913.** **Σ 2632** *rej.* Place from *Catalogus Novus.* That in *Pos. Med.* is about 1^m *f* in R. A., and does not agree exactly with the place of any DM star. A recent examination shows that the 8.9m star, DM (64°) 1411, which is closely *f*, has a distant 11.8m companion, 47°7 : 41″5 (1905.89), but it is doubtful whether this is the star originally observed by Struve. Nothing else found in the immediate vicinity.

1 26 **9915.** **♅ IV. 134.** Described as "near 64 *Aquilae.*" Identified as given. The only measure is the following:

1901.51	197°9	47″53	2*n*	β^5	9.0...9.4

1 27 **9916.** **β 429. β 440.** (ADF = **♅ III. 113** = **Sh 314** = **Σ 2630** *rej.*) The near faint companions were discovered with the 18½-inch.

A and B (= β 440)

1878.53	61°1	6″63	1*n*	β
1892.80	60.6	6.93	1*n*	Ho
1899.52	60.2	6.56	3*n*	Doo

A and C (= β 429)

1878.53	25°1	8″39	1*n*	β
1892.80	26.3	8.12	1*n*	Ho
1899.52	25.4	8.89	4*n*	Doo

A and E (= β 429)

1892.80	106°3	27″84	1*n*	Ho
1899.52	107.1	28.28	3*n*	Doo

A and D (= ♅ III. 113 = Sh 314)

1783.75	296°0	11″27	1*n*	♅
1823.58	301.0	10.79	1*n*	Sh
1892.80	300.3	11.34	1*n*	Ho
1899.52	300.7	11.35	4*n*	Doo

A and F

1783.75	32°8	29″45	1*n*	♅
1823.58	28.2	36.52	2*n*	Sh
1892.80	28.4	35.97	1*n*	Ho
1899.52	28.1	36.36	3*n*	Doo

F and G

1892.80	104°5	10″25	1*n*	Ho
1899.52	109.1	9.68	3*n*	Doo

[β (VII, VIII)...β (2103)(*Am. Jour. Sci.* July 1877)...β^1...Δ (I)...Ho (3234)... Espin (3717)...Doolittle (*Pub.Flower Obsy.* I)...]

1 31 **9919.** **Espin 25.** (= **Sh 315** = **♅ III. 113.**) The large stars, A and D, are D and E of ♅ III. 113. They are not given in the group of β 429. The small stars, B and C, were added by Espin.

[Espin (3717)(*Mon. Not.* **LXIV**, 680)...]

9921. **Σ 2627.** H (V) could not find this. Seen by Dembowski in 1866, but too difficult to measure. Plain with the 6-inch, 1876. $1^m\ 44^s$

1893.69	27°0	1″97	3*n*	Wilson	9.0...11.2
1902.65	27.3	1.96	2*n*	Hu	
1905.78	31.6	1.87	1*n*	β	

[H (V)... Ma (*F. S.* I)... Ma (X)... Δ (1736)... Lewis (*Mon. Not.* **LXVI**, 30)... β^6...]

9922. **H. C. Wilson 18.** From Cin^{10}, but the magnitudes given there make the components much too bright. In Part I this was assumed to be the 8.8 m star, Cord. DM (23°) 16016, which is noted as double. This has been recently verified by Doolittle, and the pair measured. 1 45

1905.79	314°8	21″21	2*n*	Doo	8.0...8.7

9924. **Σ 2629** *rej.* (= **β 58** *rej.*) No change. 1 50

1905.78	188°8	9″18	1*n*	β

[Δ (I, p. 290)...β (I)...β^6...]

9925. **Σ 2631.** (= **S 732.**) Fixed. 1 57

1868.63	338°2	4″47	4*n*	Δ
1902.14	339.7	4.68	3*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...H^1...H (V)...Se...WS^2...Δ (II)...Glasenapp (III) ...HΣ (XII)...Lohse (*Pub. Potsdam Obsy.*)...]

9926. **Σ 2628.** *Aquilae* **227.** Without change. 2 3

1868.08	346°7	4″22	5*n*	Δ
1886.06	346.5	4.35	5*n*	Per
1902.52	345.4	4.20	2*n*	Hu

[H^1... H (V)... Ma (*F. S.* I)... Ma (XI)... Ra (XXIII)... Bp... Ba (II, IV)... Δ (I, II).... Δ (1209).... Du.... Per.... Per (2749).... Glasenapp (III).... *Annals Toulouse Obsy.* III... Lohse (*Pub. Potsdam Obsy.*)...]

(See p. 1082)

9927. **A 278.** No other measures. 2 8

[A (3784)(*Bul. L. O.* No. 16)...]

9928. **Hn 37.** The only later position is: 2 12

1888.42	309°2	3″04	3*n*	Com

[β^4...Com (VI)...]

9929. **Σ 2647.** Fixed. 2 15

1868.04	262°1	8″25	4*n*	Δ
1898.57	260.4	8.64	2*n*	Gla
1902.54	261.7	8.58	1*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Cin^5...Glasenapp (V)...]

9931. **A. G. 246.** Noted as double in *A. G. Lund.* Nothing seen with the 40-inch on two nights in 1902. 2 25

3^m 47^s **9932.** **A 279.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

2 53 **9933.** **OΣ 398.** (AC = **A 280.**) No material change in the close pair.

1869.62	83°8	1″06	6*n*	Δ
1898.68	80.5	1.03	3*n*	Hu

The third star was added by Aitken with the 36-inch.

[Ma (**XI**)...OΣ (**IX**)...Da³...Δ (I)...Hu (*Pub. L. O.* **V**)...A (3784)(*Bul. L. O.* No. 16)...Lewis (*Mon. Not.* **LXVI**, 30)...]

3 10 **9934.** **H 1482.** Nothing since but this:

1905.47	110°2	6″01	1*n*	β^6	9.0...11.3

3 14 **9935.** **Σ 2640.** The change is due to proper motion.

1832.66	27°3	4″92	4*n*	Σ
1841.80	23.3	4.99	1*n*	Da
1868.11	23.3	5.08	4*n*	Δ
1883.48	21.8	5.20	6*n*	En
1889.65	22.0	5.33	3*n*	Hl
1895.81	21.5	5.39	2*n*	Collins
1898.41	20.8	5.48	4*n*	Doo

[Ma (*F. S.* I)... Ma (**XI**)... Da³... Bp... Bru... Ba (**II**)...WS...WS²...Gl... Do (2199, 2303)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Sk...Bl (**V**)... Δ (**II**)... En (2677)... Hl (**II**)... Sk⁴... Collins (*A. J.* 378)... Doolittle (*Pub. Flower Obsy.* I)...Espin (*Mon. Not.* **LXIV**, 677)...]

(See p. 1082)

3 16 **9936.** **Σ 2633.** (= **H 1483.**) No change. The two small stars *p*, mentioned by H, are too distant to be of interest, 263°3 : 46″9 and 249°1 : 72″0 (1905.81).

1866.94	102°5	11″56	3*n*	Δ
1901.99	102.0	11.91	3*n*	Hu
1905.81	102.7	11.66	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Cin⁶...β^6...]

3 31 **9938.** **H 2932.** Nothing later but the following:

AB	1904.44	146°2	11″88	1*n*	β^6	10.0...10.5
AC	1904.44	213.7	20.43	1*n*	β^6	...12.0

There is a fainter star in 351°.

3 41 **9939.** **β 470.** Discovered with the 6-inch. In the field 16ˢ *p* and 4′ *n* of Σ 2642.

1892.63	215°7	2″48	3*n*	Wilson
1901.17	212.1	2.47	6*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (I)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

3 50 **9941.** **A. G. 247.** "Dupl.?" in *A. G. Berlin.* Not seen double in 1902 by Miller (*A. J.* 546), and Doolittle found it certainly single on five nights in 1905. He measures a distant companion:

1905.95	27°9	36″01	2*n*	Doo	8.9...11.9

9942. **Da 12.** From the list of new pairs by Dawes in *Mon. Not.* XXIV, 117; but there is no reference to it in his subsequent measures, and it is probable that he was unable to find it. Looked for twice with the 6-inch (1876) and not found. There is no 8 m star in this place. 3^m 55^s

9943. **A 382.** No other position but this: 3 56

1903.50	89°9	1″21	1*n*	Lewis

[A (*Bul. L. O.* No. 29)...Lewis (*Mon. Not.* **LXIV**, 804)...]

9944. **Σ 2642.** There appears to be a little change in the angle and distance, but the stars have a nearly common proper motion: 3 57

Stumpe	0″247 in 51°5
Porter	0.256 in 50.4

Apparently a system of the 61 *Cygni* type.

1832.51	165°2	2″45	3*n*	Σ
1844.90	169.2	2.38	1*n*	Ma
1851.87	168.5	2.33	1*n*	OΣ
1867.86	170.5	2.14	4*n*	Δ
1889.65	171.0	2.13	3*n*	Hl
1897.61	173.6	2.16	2*n*	Gla
1899.53	172.7	2.16	1*n*	Bryant

[Ma (*F. S.* I)....Ma (**XI**)....OΣ (**IX**)....Δ (**II**)....Hl (**II**)....Glasenapp (**V**).... Bryant (*Mon. Not.* **LX**, 512)...]

9945. **H 606.** The only measures are of late date. 3 57

1900.69	228°3	43″00	2*n*	Espin	
1905.80	228.7	43.65	2*n*	β	8.6...8.6

[Espin (3717)...β^6...]

9949. **Σ 2634.** (= **H II. 70** = **S 734.**) A little change in distance. The principal star has a proper motion of 0″184 in 357°3 (*A. G. Berlin*). 4 6

1866.25	13°3	6″03	3*n*	Δ
1885.72	12.8	6.10	2*n*	Per
1894.57	11.8	5.59	2*n*	Gla
1902.56	13.6	5.81	3*n*	Hu
1905.78	13.3	5.66	1*n*	β

[Ma (*F. S.* I)...Ma (**XI, XIII**)...Se...OΣ (**IX**)...WS...Δ (**II**)...Per...Per (2749) ...β (*Mon. Not.* **XXXIV**, 379)...Glasenapp (**III**)...β^6...]

9950. **Σ 2635.** *Aquilae* **231.** Fixed. The proper motion of A is given: 4 19

Glasgow	0″179 in 211°5
Paris	0.220 in 199.7

The companion evidently has the same movement.

1866.68	80°4	7″18	4*n*	Δ
1878.81	79.3	7.18	1*n*	β
1905.78	78.8	7.02	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H (**V**)...Δ (**II**)...β¹...Glasenapp (**III**)...β^6...]

(See p. 1082)

9951. **Ho 119.** No change. 4 27

1894.71	19°3	3″03	2*n*	Ho
1904.70	18.3	3.19	3*n*	Doo

[Ho (2779, 3558)...Glasenapp (I)...]

$4^m\ 30^s$ **9952.** Σ 2638 *rej.* Measures by β^6.

4 31 **9953.** **H** 1484. H (V) 330°0:15″± (1830+). Nothing later but this:

1905.47	331°1	20″15	1*n*	β^6	8.5...11.0

4 39 **9954.** **S** 737. These stars are DM (20°) 4454 and 4455. No measure since 1824 but the following:

1902.50	129°3	100″89	2*n*	β^6	7.5...8.2

4 39 **9955.** *θ Sagittae.* **Σ 2637.** (= **Ḫ III. 24** = **S** 736 = **Σ 49, App. I** = **OΣ (App) 201.**) No change in AB, but these stars have a small common proper motion. The motion of A from meridian observations is given:

A. G. Berlin	0″114 in 21°7
Rechenberg	0.114 in 27.2

A and B

1866.39	326°3	11″44	4*n*	Δ
1886.66	326.9	11.56	3*n*	Hl
1892.11	327.3	11.54	4*n*	Gla
1901.98	328.1	11.63	3*n*	Hu

A and C

1781.64	.....	57″82	1*n*	Ḫ
1832.82	226°6	70.70	8*n*	Σ
1851.80	226.1	72.86	1*n*	OΣ
1877.24	224.5	76.46	6*n*	Je
1886.15	224.9	76.91	4*n*	Per
1898.62	224.1	77.91	4*n*	Coleman
1903.28	224.4	78.30	4*n*	β

The measures of Σ and β (1832–1903) give for the proper motion of A, 0″115 in 24°9.

[Ma (*F. S.* **I**)...Ma (324)...Ma (**X, XI, XIII**)...H (**V, VII**)...Wr...Se...Se^3...Ra (**XXI, XXVI, XXXV, XXXVIII**)....Flm....OΣ (**IX, X**)....Δ (1209)....Δ (**I, II**)...Nobile (*Rend. della R. Accad. Sci.* Napoli, Dec. 1877)...Sk^2...Engelhardt (**III**)...Je (2343)...Goldney (2257)...Sp (**II**)...Per...Per (2749)...En (2677)...Maiebckato (*Obsns.* 1892)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Rechenberg (3482)....Glasenapp (**III**)....Franz (3464)....Do (3680)....*Annals Toulouse Obsy.* **III**..Coleman (*Mem. R. A. S.* **LIV**)...β^6...]

4 42 **9956.** **Σ** 2639. (= **S** 733.) Fixed.

1868.34	302°4	5″64	4*n*	Δ
1893.61	301.0	5.64	3*n*	Gla
1902.05	302.3	5.87	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Wr...Se...Da^2...Δ (**II**)...Glasenapp (**III, IV**)...*Annals Toulouse Obsy.* **III**...]

4 57 **9958.** **H** 1485. No relative change.

1875.67	277°5	4″65	3*n*	Δ	8.0...8.7
1885.54	278.0	4.71	2*n*	HΣ	7.8...8.9
1902.53	278.9	4.65	3*n*	β	8.3...8.7

[Δ (**I**)... Sadler (*Eng. Mech.* **XLIII**, 370)... OΣ (**X**, p. 140)... HΣ (**XII**)...β^6...]

5 7 **9960.** *θ Aquilae.* **Ḫ VI. 27.** No attempt has been made the last hundred years to identify the Herschel pair. *θ Aquilae* has a very distant companion, which I have measured:

1901.55	260°0	113″71	2*n*	β^5	...13.0

Herschel's place is that of *θ Aquilae;* but in the original catalogue (*Phil. Trans.* 1782) it is described, "a star north of *θ*; distance about 1′," and it is not probable that the star measured is the right one. Most likely it is the 8m star, L 38760, which is $2^m\ 43^s$ *f θ* and 4′1 *s*. I have measured this as follows:

1901.55	80°4	64″07	2*n*	β^5	7.1...8.5

This star has a proper motion of 0″262 in 336°7 (Radcliffe). *θ Aquilae* is a spectroscopic binary, discovered by Deslandres (*Bul. Ast.* XX, 129).

9961. **S** 735. (= **Ḫ V. 136** = **σ 661.**) The only observations since 1825 are: $5^m\ 9^s$

1879.60	204°5	55″30	3*n*	Cin^5	7.3...8.0
1901.65	206.2	55.36	2*n*	β^5	7.5...7.7

9962. **Ḫ VI. 92.** The components are SD (12°) 5663 and 5662. The distance is erroneously reduced, and printed 51″35 in Cin. It should be as given here: 5 9

1879.63	265°8	85″53	1*n*	Cin^5	8.0...9.5
1900.79	265.2	85.25	4*n*	β^5	8.1...9.0

9963. **β** 833. Discovered with the 15½-inch at the Washburn Observatory. Probably no change. Boothroyd measures a 12m star from A, 357°2:43″63 (1898.72) 3*n*. 5 11

B and C

1884.82	58°4	2″10	1*n*	Ho
1888.08	59.2	2.45	3*n*	Com
1898.53	59.9	2.18	3*n*	Doo
1898.62	57.7	2.41	3*n*	A
1898.73	61.1	2.13	4*n*	Bd

A and B

1886.86	63°0	119″65	3*n*	UL
1898.60	63.1	119.74	3*n*	A
1898.72	63.1	120.66	3*n*	Bd

[β (**XII**)...β^4...Ho (2978)...UL... Com (**VI**) ... Doolittle (*Pub. Flower Obsy.* **I**)...A (3585)...Boothroyd (*A. J.* 478)...]

9966. **Σ** 2636. No change. 5 20

1866.66	204°2	12″50	3*n*	Δ
1902.52	202.7	12.63	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)... H (**VII**)... Mh...WS^2... Δ (**II**)...Cin^4...Cin^5...Wilson (Cin^{10})...Glasenapp (**II**)...]

9968. **See** 409. Cogshall could not find this pair in 1899. 5 30:

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9969. **H** 906. The only later measures are: 5 33

AB	1905.83	154°9	11″84	2*n*	Doo	9.5... 9.9
AC	1905.83	349.2	34.72	2*n*	Doo	...11.2

9970. **Espin** 87. The only later measures are by Doolitttle: 5 44

1905.79	297°6	9″23	4*n*	Doo	8.7...9.3

[Espin (3784)...]

5m 47s **9971.** **β 1205.** Discovered with the 12-inch. In SD 7.0 m.

1897.71	46°.6	0″.70	3*n*	A
1897.79	48.2	0.59	1*n*	Brown

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (*A. J.* 429)...Brown (3646)...]

5 53 **9972.** **Σ 2641.** Unchanged.

1868.17	169°.3	20″.68	4*n*	Δ
1905.78	169.6	20.68	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin^5...β^6...]

5 56 **9973.** **β 150.** (= **OΣ 541**; AB = **S 738** = **σ 663**.) The duplicity of the smaller member of the wide pair, S 738, was discovered with the 6-inch. No change.

B and C

1840.82	191°.6	1″.55	1*n*	OΣ
1893.51	187.7	1.85	3*n*	Lv
1898.69	186.6	1.80	3*n*	Hu
1898.75	187.2	1.78	4*n*	Doo

A and B (= S 738)

1824.69	112°.3	41″.86	1*n*	S
1840.82	111.7	41.24	1*n*	OΣ
1885.91	110.3	41.40	5*n*	Eng
1899.24	109.2	41.45	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...OΣ (**IX**, **X**, p. 45)...Lv (*A. J.* 382)....Engelhardt (2785)(**II**).... Doolittle (*Pub. Flower Obsy.* **I**) .... Hu (*Pub. L. O.* **V**)...]

6 0 **9975.** **Σ 2650** *rej.* Estimated, 240°:25″:7...10 (1876). The only measure is:

1905.39	229°.3	21″.83	2*n*	β^6	7.6...10.5

6 1 **9976.** **Ho 587.** A later position is:

1904.72	64°.4	12″.81	3*n*	Doo

[Ho (3557)...]

6 2 **9977.** **A 281.** Double in *A. G. Leiden.* No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

6 11 **9978.** **Σ 2645.** Without change.

1869.47	137°.8	1″.44	4*n*	Δ
1894.56	138.0	1.51	2*n*	Gla
1903.55	138.2	1.55	2*n*	Hu

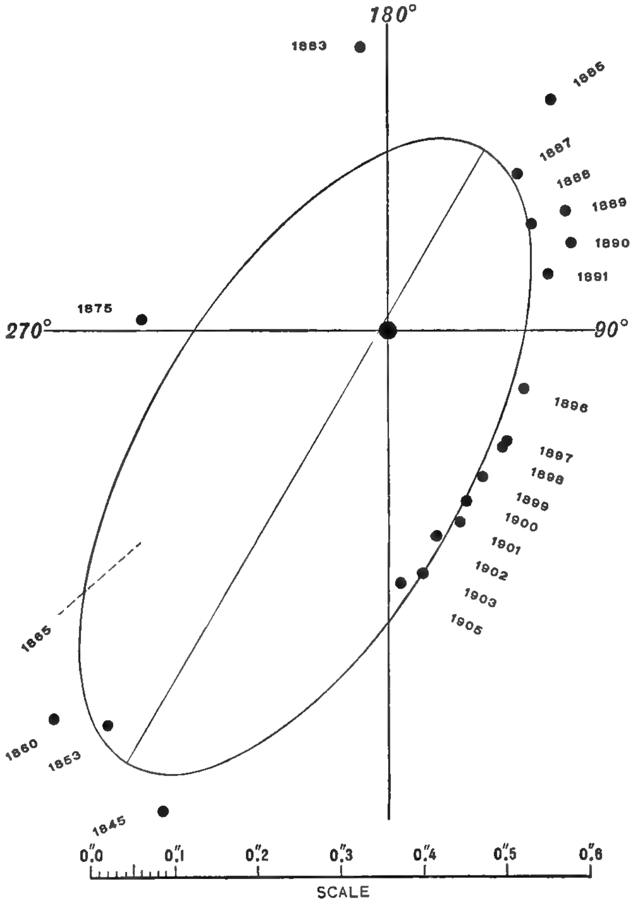
[Ma (*F. S.* **I**)... Ma (**X**, **XI**, **XIII**)...H^1...Se...Δ (1209)... Δ (**I**, **II**)...Glasenapp (**III**)...]

6 15 **9979.** **OΣ 400.** Binary. Nearly one revolution has been made since the first measures. The following orbits have been published:

1885	Gore	170.37 yrs.	*Mon. Not.* XLVII, 346
1897	Burnham	81.04	*Mon. Not.* LVIII, 87
1897	Doberck	100.12 60.92	*A. N.* 3525
1900	Hussey	78.67	*Pub. L. O.* V.

The complete measures are:

1843.39	326°.7	0″.5 ±	2*n*	Ma
1845.73*	334.9	0.64	3*n*	OΣ
1853.25*	324.6	0.59	2*n*	OΣ
1853.89	320.5	0.65 ±	1*n*	Da
1860.10*	319.3	0.62	2*n*	OΣ
1865.72*	310.7	....	2*n*	Δ
1868.55	301.6	Obl.	1*n*	Δ
1871.04	301.2	Oval	2*n*	Δ
1872.62	314.9	Obl.?	1*n*	Δ
1873.88	94.0?	Obl.?	2*n*	Δ
1874.50	107.8	Obl.?	1*n*	Δ



OΣ 400.

1875.67*	267°.9	0″.3 ±	3*n*	Sp
1877.59	Single		1*n*	Δ
1878.65	Single		1*n*	β
1879.82	150.2	>0.5 ±	2*n*	Sk
1880.68	Single?		1*n*	Sp
1881.70	Single		1*n*	Big
1883.62	"Not divided"		1*n*	Sk
1883.63*	185.3	0.35 ±	1*n*	Sp
1885.72*	144.5	0.3 ±	2*n*	Young
1885.75	172.2	1 ±	2*n*	Sk
1886.73	125.0	0.4 ±	2*n*	HΣ
1887.71	122.7	0.3 ±	1*n*	Ho
1887.91*	140.1	0.25 ±	1*n*	Sp
1888.89*	126.2	0.22 ±	8*n*	Sp

1889.75*	123°5	0″3±	1*n*	HΣ
1889.86*	123.9	0.23±	5*n*	Sp
1890.93*	115.4	0.25±	2*n*	Sp
1891.76*	104.1	0.25	1*n*	HΣ
1891.93*	114.6	0.17±	2*n*	Sp
1892.79	120±	0.2±	1*n*	Com
1892.91	129.3	0.5±	1*n*	Sp
1893.96	57.7	0.15±	1*n*	Sp
1895.73	346.8	0.2±	2*n*	See
1896.90*	67.8	0.19±	2*n*	Hu
1896.93*	65.7	0.18	4*n*	A
1897.74*	47.3	0.20	3*n*	A
1898.61*	44.4	0.20	4*n*	A
1898.62*	44.7	0.20	3*n*	Hu
1899.67*	36.6	0.20	7*n*	Hu
1899.70*	29.0	0.23	4*n*	A
1899.78	25.2	0.26	2*n*	See
1899.81	23.2	0.22	1*n*	Brown
1900.51*	25.3	0.22	5*n*	Hu
1900.68*	23.8	0.24	2*n*	A
1901.57*	20.0	0.24	1*n*	Hu
1901.65*	21.6	0.26	2*n*	A
1902.60*	13.4	0.26	3*n*	A
1902.60*	11.2	0.28	3*n*	Hu
1903.79*	8.1	0.30	3*n*	Biesbroeck
1905.29*	2.8	0.31	1*n*	A

The orbit shown on the diagram gives a period of 74.5 years.

[Ma (**XI**)...OΣ (**IX**)... Da^3... Flm... Big... Δ (**I**)... Sk... Sk^3...WS^2...β^1... Gore (*Mon. Not.* **XLVII**, 346)... Ho (2978)... Sp (2133)... Sp (**II, II** App.)... Com (*Pub. Washburn Obsy.* **X**)....β (*Mon. Not.* **LVIII**, 87)....Do (3525).... See (*A. J.* 359)....A (*A. J.* 429) (3466, 3585)(*Bul. L. O.* No. 11).... Hu (*A. J.* 397)(*Pub. L. O.* **V**)(*Bul. L. O.* No. 40)...HΣ (**XII**)... Biesbroeck...]

(See p. 1082)

6^m 17^s **9980.** **OΣ 399.** Without change.

1867.81	278°9	4″50	4*n*	Δ
1898.68	279.3	4.74	4*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Da^3...Δ (**I**)...Per...Per (2560)...Hu (*Pub. L. O.* **V**)...]

6 28 **9982.** **Σ 2644.** (= **H̶ II. 96** = **Sh 317.**) Fixed.

1867.85	211°9	3″20	4*n*	Δ
1884.46	209.7	3.23	5*n*	Per
1888.75	210.1	3.18	3*n*	HΣ
1902.66	208.1	3.15	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)...Ma (**IX, X, XI, XIII, XV**)...Wr...J^2...Bp...Da^3... Ra (**XXIII**)... Se (1017)... Se... Se^3... OΣ (**IX**)... Giacomelli (**III**)... Kn... WS^2... Δ (*Mem. Accad. Sci.*)... Δ (1032, 1194)... Δ (**I, II**)... Ba (**II**)... Ferr ... Hd...Waldo (2190)... Je (2407, 2449)... T (2991, 3185)... Per...Per (2559, 2749)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

6 31 **9983.** **Σ 2643.** Without change.

1866.27	71°8	3″02	3*n*	Δ
1902.53	73.2	3.12	2*n*	Hu
1903.60	70.9	3.24	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Se...*Wash. Obsns.* 1862...Δ (**II**)...Glasenapp (**I**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

6 43 **9986.** **H 907.** The following are all the measures:

1828.64	127°8	3″±	1*n*	H^1	
1903.32	132.1	6.17	2*n*	β^6	9.5...10.5

There is a 14 m star from A, 244°6 : 8″8.

6^m 48^s **9987.** **β 430.** (AC = **H 1489.**) The close pair was discovered with the 6-inch. It is probable there is an error of 180° in the angle of the wide pair by H, as the *p* star is obviously the brightest, and so in DM, where the respective magnitudes are 9.3 and 9.5.

A and B

1893.51	21°1	0″98	3*n*	Lv	8.9...10.0
1898.76	23.8	0.97	4*n*	Doo	8.7... 9.7

AB and C (= H 1489)

1828	236°3	13″±	1*n*	H
1893.55	52.5	17.15	1*n*	Lv
1898.76	51.6	16.87	4*n*	Doo

[β (**VII**)...β (2103)...Δ (**I**)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* **I**)...]

6 51 **9988.** **H 1490.** This is 105″2 in the direction of 54°1 from A of β 430.

1904.48	356°9	8″45	1*n*	β^6	10.2...11.5

6 51 **9989.** **β 982.** Discovered with the 18½-inch. It is the *sf* star of a wide pair. There is a 6.2 m star 6′5 *n*. All the later measures are given.

1893.51	50°1	0″81	3*n*	Lv
1901.78	49.4	0.91	2*n*	A
1903.00	51.7	0.88	3*n*	Doo

[β (**XIII**)....β^3....Lv (*A. J.* 382)....A (*Bul. L. O.* No. 11)....Doolittle (*Pub. Flower Obsy.* **II**)...]

6 54 **9991.** **Σ 2648.** Fixed.

1865.95	117°7	6″28	3*n*	Δ
1902.53	116.5	6.60	1*n*	Hu

[H (**IV**)...Ma (*F. S.* **I**)...Δ (**II**)...Cin^6...]

6 56 **9992.** **H 1491.** "Very neat double star."

1880.67	118°4	4″69	1*n*	Big	10.3...10.3
1900.61	119.5	4.24	2*n*	Espin	9 ... 9

[Big...Espin (3717)...]

7 3 **9994.** **Σ 2652.** Only a little retrograde motion since the measures of Struve. The distance appears to be constant. All the measures are given.

1832.62	280°3	0″32	3*n*	Σ
1836.51	283.2	0.28	2*n*	Σ
1841.11	290.5	Cun.	2*n*	OΣ
1841.51	271.6	0.32±	2*n*	Ma
1844.44	276.7	0.37±	2*n*	Ma
1854.69	282.2	0.40	1*n*	OΣ
1854.83	(146.6)	....	1*n*	Ma
1857.37	278.9	0.3±	2*n*	Se
1863.88	Single		1*n*	Δ
1878.53	269.9	0.42	1*n*	β
1890.68	264.0	0.31	3*n*	β
1897.59	280.2	0.25	2*n*	Gla
1899.53	256.2	0.26	1*n*	Bryant
1905.46	258.9	0.34	1*n*	A

[Ma (*F. S.* **I**)... Ma (**IX, XI, XV**)... OΣ (**IX**)... H (**V**)... Δ (1736)... Se (*Comp. Rend.* **XLVIII**, 375)...Se...Flm...β^1... β (3048)(*Pub. L. O.* **II**)...Glasenapp (**V**)...Bryant (*Mon. Not.* **LX**, 513)...]

$7^m\,13^s$ **9998.** **See 411.** A later measure gives a much smaller distance:

1899.58	5°2	1″77	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

7 18 **9999.** **A. G. 248.** Double in *A. G. Albany*, 30°: 5″. Measures by Cogshall (*A. J.* 554).

7 19 **10000.** **H 2937.** Nothing later but the following:

1905.47	91°1	9″22	1*n*	β^6	9.7...10.5

7 22 **10001.** **Ho 120.** The later measures are:

AB	1895.98	105°6	0″93	3*n*	Ho
	1904.66	109.2	0.99	3*n*	Doo
AC	1892.77	200.7	27.78	1*n*	Ho
	1904.66	201.3	26.67	3*n*	Doo

[Ho (2779, 3558)...]

7 25 **10002.** **A 282.** (ACD = **Ho 121**). The principal star of the wide triple, Ho 121, was found to be a close pair by Aitken. No other measures of this.

AB and C

1889.43	17°5	22″42	3*n*	β
1901.40	17.0	22.80	2*n*	A
1904.66	17.5	22.52	3*n*	Doo

AB and D

1904.66	15°2	42″49	3*n*	Doo

[Ho (2779, 3558)...*Bul. Int. Photo Congress* **III**, 218...β (2957)(*Pub. L. O.* **II**)... A (3784)(*Bul. L. O.* No. 16)...]

7 30 **10004.** **H 2939.** The later position does not agree in angle with H.

1905.55	143°9	9″52	2*n*	β^6	8.7...10.1

7 34 **10005.** **Σ 2649.** One of the stars has a proper motion of about 0″03.

1832.20	152°3	26″08	3*n*	Σ
1847.39	151.1	25.94	1*n*	Ma
1865.03	151.7	24.90	7*n*	Δ
1877.68	151.5	24.29	3*n*	Sp
1880.78	151.0	24.36	1*n*	Pt
1896.54	151.5	24.19	3*n*	Soulé
1896.56	151.8	24.16	2*n*	Lv
1905.38	151.6	23.96	2*n*	β

[Ma (*F. S.* **II**)... Δ (1573) ... Δ (**II**) ... Flm ... Sp (**II**)... Pt ... Lv (*A. J.* 407) ... Soulé (*A. J.* 410)...β^6...]

7 43 **10007.** **A. G. 249.** Double in *A. G. Leiden.*. Measures by β^6. Two 14 m stars, forming a small pair, from A, 35°:13″.

10007½. **Lalande 38760.** Measured for ♅ VI. 27 (No. 9960). This star has some proper motion: $7^m\,49^s$

Rad^3.	0″262 in 336°7
Paris	0.268 in 327.9

[β^6...]

10008. **OΣ 401.** (= **♅ N. 86.**) Apparently fixed. No measures by ♅. 7 51

1866.87	59°2	13″92	3*n*	Δ
1898.61	60.7	14.03	3*n*	Hu

[OΣ (**IX**)... Δ (**I**)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

10009. **Σ 2646.** *Aquilae* **241.** (= **S 739.**) The change is due to proper motion. 8 1

1829.40	51°6	24″70	3*n*	Σ
1866.43	49.3	23.33	4*n*	Δ
1877.67	49.2	22.73	2*n*	Sp
1887.87	48.6	22.48	2*n*	Hl
1892.53	47.4	21.98	2*n*	Gla
1905.52	47.3	21.95	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... Mh ... Δ (1573) ... Δ (**II**)... Flm ... Cin^4 ... Cin^5... Cin^6...Sp (**II**)... Pt ... Hl (**II**)...Glasenapp (**I**)...*Annals Toulouse Obsy.* **III** ...β^6...]

10010. **H 1492.** No magnitudes in H. Noted as double in *A. G. Cambridge*. Since Part I was in type, and very recently, Aitken has found that the *f* star is a close pair. 8 1

B and C

1905.69	174°8	0″32	2*n*	A	9.7...10.1

A and BC

1902.03	54°9	18″31	2*n*	β^6	9.2... 9.3
1905.68	54.9	18.20	1*n*	A	9.0... 9.2

(See No. 13516)

10011. **Σ 2651.** No change. The components have a common proper motion of 0″012 in 284°6 (*A. G. Berlin*). 8 15

1866.64	280°2	1″72	3*n*	Δ
1875.70	281.3	1.53	2*n*	Sp
1902.47	281.4	1.62	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...OΣ (**IX**)...H (**V**)...Se...Δ (1209)...Δ (**I, II**)...Sp (**II**) ...Per...Per (2749)...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LXVI**, 30)...]

10012. **S 740.** (= **σ 664** = **OΣ (App) 202.**) These stars have a common proper motion: 8 18

A =	0″214 in 249°4	Stumpe
	0.197 in 236.1	Bossert
	0.192 in 234.7	Glasgow

The components are DM (6°) 4480 and 4479. The following are all the measures:

1874.91	192°9	43″34	4*n*	Δ (I)	6.8...7.3
1891.72	192.4	43.01	2*n*	Eng (III)	
1901.65	192.8	43.18	3*n*	β^5	7.3...7.4

10013. **A. G. 250.** Double in *A. G. Leiden.* Measures by β^6. 8 19

8^m 21^s **10014.** **Arg.** 36. (= **Espin** 133.) "Duplex" in O. Arg. N.

1902.51	129°1	7″86	2*n*	β	8.7...9.2

[Espin (*Mon. Not.* **LXIII**, 173)...β^6...]

8 25 **10015.** **H** 2941. DM (19°) 4327, in the field *sp*, has a 10 m companion, 323°7 : 23″0.

1905.47	109°7	6″15	1*n*	β^6	9.5...9.7

8 29 **10016.** **OΣ (App)** 203. No material change.

1887.09	37°3	90″30	4*n*	Franz
1905.38	37.2	90.01	2*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

8 31 **10017.** **Σ** 2653. Perhaps a little change in angle and distance.

1866.26	260°6	2″42	3*n*	Δ
1887.39	262.0	2.53	3*n*	HΣ
1902.48	265.0	2.66	3*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Se....Δ (**II**)....T (2899)....Glasenapp (**V**)....HΣ (**XII**)...]

8 32 **10018.** **H** 1494. The only pair I could find in the immediate vicinity has about the Herschel place, but otherwise does not answer the description.

1905.36	169°5	3″41	1*n*	β^6	10.2...11.7

8 35 **10019.** **Hn** 157. No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

8 50 **10022.** **Σ** 2655. (= **Ħ N.** 55 = **S** 741.) Fixed. A distant star measured by South.

1867.41	3°2	6″05	4*n*	Δ
1885.74	2.9	6.28	2*n*	Per
1902.47	2.9	6.16	2*n*	Hu

[Σ^1...Ma (*F. S.* **I**)...Ma (**X, XV**)...H^1... H (**V**)... Bp... Se... Ra (**XXIV**)... Δ (*Mem. Accad. Sci.*)... Δ (1032)... Δ (**I, II**)...Wr...Du...Ba (**II**)...Per...Per (2749)...Glasenapp (**III, V**)...Ho (3558)...*Annals Toulouse Obsy.* **III**...]

8 54 **10023.** **Σ** 2654. (= **Sh** 318.) Probably fixed.

1866.34	233°3	14″06	3*n*	Δ
1902.43	233.8	14.33	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh... Ra (**XXIII**)... Δ (1209)... Δ (**I, II**)...T (3185)...Glasenapp (**I, II, III**)...Scott (*Brit. Ast. Ass'n* **V**, 75)...*Annals Toulouse Obsy.* **III**.. Je (2407)...]

9 6 **10024.** **A** 723. No other measures.

[A (*Bul. L. O.* No. 65)...]

9 11 **10025.** **A. Clark** 17. B. A. C. 6959. Discovered at the observatory of Dawes in 1859 by Alvan Clark. Probably fixed. The large star is given a proper motion of 0″042 in 254°8 (*A. G. Harvard*).

1874.10	81°4	4″03	4*n*	Δ	5.9...10.0
1904.46	80.8	4.01	2*n*	β	

[Da (*Mon. Not.* **XVII**, 257)...Da^4...Δ (**I**)...WS...WS^2...OΣ (**X**)...β^6...]

9^m 15^s **10026.** **Hd. Zones.** "Elegant double," *Harvard Zones.* Measures from Cin^5. The only other measures are:

AB	1902.13	257°8	1″79	2*n*	β^5	9.0...10.5
AC	1902.13	270.6	31.39	2*n*	β^5	...10.0

9 19 **10027.** **β** 762. Discovered with the 6-inch. No change.

1887.72	303°8	2″78	4*n*	Pollock
1891.13	303.3	2.36	3*n*	β
1896.69	301.7	2.33	5*n*	See
1897.62	303.8	2.49	2*n*	Scott
1901.22	303.0	2.57	5*n*	Doo

[β (**XI**)....β^2....β (3114) (*Pub. L. O.* **II**)....Cin^4....Pollock (*Pub. Sydney Obsy.* 1891) (*Mem. R. A. S.* **L**)....Sellors (3158, 3240)....See (3496)....Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

9 24 **10028.** **OΣ** 402. (= **H** 1496.) No change. Error of 2^m R. A. in H.

1867.10	34°7	15″17	4*n*	Δ
1898.63	34.5	15.39	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

9 29 **10029.** **H** 910. No measures in H, and C not mentioned. Measures by β^4. The observations appear to show change in the distance of C.

A and B

1879.63	318°6	.....	1*n*	Cin	7.0...13.0
1905.45	319.6	13″64	1*n*	β	7.0...12.5

A and C

1879.63	248°0	26″75	1*n*	Cin	...12.7
1905.45	246.7	28.80	1*n*	β	...12.0

[β^4...Cin^5...β^6...]

(See p. 1082)

9 40 **10031.** **β** 660. Discovered with the 18½-inch. The other measures are:

1884.55	320°5	9″72	2*n*	HΣ
1898.57	320.2	9.60	3*n*	A
1901.62	319.5	9.68	3*n*	Doo

[β (**X**)...β^1...A (3585)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9 44 **10033.** 3 *Capricorni.* **β** 294. These faint companions were noted with the 26-inch of the Naval Observatory. The large star has a proper motion of 0″020 in the direction of 275°6 (Auwers).

BC	1898.56	180°4	7″49	2*n*	A
AB	1898.56	36.0	26.54	2*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3114) (*Pub. L. O.* **II**)...A (3585)...]

$9^{m}\,46^{s}$ **10035.** **Σ 2656.** (= **β** 667 *rej.*) Without change. There is an error of 10^{m} R. A. in the place of β 667, making it identical with **Σ** 2656.

1866.69	235°2	9″42	3*n*	Δ
1886.80	234.0	9.49	1*n*	HΣ
1902.50	234.0	9.56	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... H (**V**)... Hd... WS^{2}... Δ (**II**)... β (**X**)... HΣ (**XII**)...]

9 51 **10036.** o^{2} *Cygni.* (AB = **H 1495**; AC = **Ḫ VI. 10, 33** = **OΣ** (**App**) **204** = **S 742**; ACD = **Σ 50, App. I.**) The small star B from H. D is o^{1} *Cygni*, and C is P. XX. 63. Large stars apparently unchanged. Other faint stars measured in β^{1}, and Espin (3717). There is an error of 10° in the angle of AB in β^{1}. The large stars have no appreciable proper motion.

AB	1878.39	331°7	36″82	1*n*	β	
	1903.21	330.3	36.49	3*n*	β	...13.0
AC	1869.45	173.7	107.11	6*n*	Δ	
AD	1869.45	323.5	338.02	6*n*	Δ	

The principal star is a spectroscopic binary, Campbell (*Astrophysical Jour.* XIV, 138).

[Ra (**XXVI**)... Δ (**II**)...Pk...Bl (**V**)...Schur (2255)... Flm (*L'Astronomie* **II**, 217) ...Je (2343)...β^{1}... Franz (3080)... Glasenapp (**III**)... Espin (3717)...β^{6}...]

9 56 **10037.** **Ho 122.** Near 21 *Vulpeculae*, 39^{s} *p* and 1′7 *n.* No motion. A 13m star, 156°: 19″5.

1895.69	74°6	1″00	2*n*	Ho
1904.69	74.0	1.11	3*n*	Doo

[Ho (2779, 3558)...]

10 11 **10040.** **β 983.** B. A. C. 6966. Discovered with the 18½-inch. In Heis and Argelander this star is 5m (*Vulpecula*); Harvard photometry 4.8. The later measures are:

1888.84	155°6	0″81	5*n*	Sp
1899.51	152.6	1.04	3*n*	A
1901.55	149.6	1.20	3*n*	Doo

[β (**XIII**)...β^{3}...Sp (**III**)...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10 13 **10041.** **OΣ 403.** (AC = **Σ 2657** *rej.*) No change in C, and probably none in the close pair.

A and B

1870.10	172°3	0″86	6*n*	Δ
1898.62	170.3	0.78	3*n*	Hu
1901.97	170.7	0.76	3*n*	Doo

B and C

1867.85	33°8	11″72	4*n*	Δ
1898.62	32.9	11.97	3*n*	Hu

[Ma (**XI**)... H (**IV, V**)... OΣ (**IX**)... Δ (**I**)... Du... Big... En (2678)... Glasenapp (**III**)...Do (3466, 3680)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10 27 **10042.** **Σ 2660.** Fixed.

1866.96	167°4	22″07	3*n*	Δ
1895.66	166.7	22.12	2*n*	Gla
1902.50	166.6	22.28	2*n*	Hu

[Δ (**II**)...Cin^{6}...Glasenapp (**IV**)...]

10044. **Σ 2658.** (= **Ḫ N. 72.**) Change from proper motion of A. This is given from meridian positions: $10^{m}\,29^{s}$

Bossert	0″166 in 15°8
A. G. Harvard	0.169 in 15.0
Σ−β	0.189 in 11.8

The last value is from the measures of AC in 1832 and 1903. The nearest companion, B, has nearly the same proper motion as A.

1831.62	126°9	5″49	4*n*	Σ
1868.03	121.9	5.43	5*n*	Δ
1879.70	119.1	5.41	2*n*	Hl
1889.67	118.7	5.50	3*n*	Hl
1896.55	116.4	5.50	5*n*	Soulé
1897.60	118.7	5.25	2*n*	Gla
1902.50	117.7	5.61	2*n*	Hu
1903.21	117.4	5.30	3*n*	β

A and C

1832.14	216°8	32″07	3*n*	Σ
1865.80	213.2	38.03	4*n*	Δ
1878.65	212.4	40.50	1*n*	β
1896.52	210.3	43.67	3*n*	Soulé
1897.60	211.3	43.69	2*n*	Gla
1902.50	210.6	44.59	2*n*	Hu
1903.21	209.5	44.62	3*n*	β

[Ma (*F. S.* **I, II**)... Ma (**XI, XIII**)... H^{1}... Δ (1475)... Δ (**II**)... Flm...WS^{2}... β^{1}...Hl (**I, II**)... Collins (*A. J.* 378)... Soulé (*A. J.* 410)... Glasenapp (**V**)... Furner and Storey (*Mon. Not.* **LXIV**, 448)...β^{6}...]

10047. **β 59.** Discovered with the 6-inch. No motion. 10 36

1892.65	116°5	8″72	3*n*	Wilson
1898.46	116.0	8.59	3*n*	Doo

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....Δ (**I**)....Wilson (   )....Doolittle (*Pub. Flower Obsy.* **I**)...]

10049. **A 283.** No other measures. 10 44

[A (3784)(*Bul. L. O.* No. 16)...]

10050. **Ho 123.** Change in angle? 10 55

1893.73	220°4	2″63	2*n*	Ho
1903.77	225.5	2.69	2*n*	β
1904.58	226.6	2.81	4*n*	Doo

[Ho (2779, 3558)...Doolittle (*Pub. Flower Obsy.* **II**).. β^{6}...]

10052. **Ḫ N. 127.** "The middle of three *nf* α *Capricorni.*" Wilson (Cin^{10}) measures a pair with this approximate place, described as "near α *Capricorni*," 96°3 : 8″32 : 9.0...9.5 (1882.62) 2*n*. I did not find this in trying to identify the Herschel pair. The only pair found *nf* α *Capricorni* is SD (12°) 5704, the place of which is: 11 ±

$$\left.\begin{array}{l}\text{R. A.} = 20^{h}\,15^{m}\,58^{s}\\ \text{Decl.} = -12^{\circ}\,45'9\end{array}\right\}$$

1902.50 205°5 41″91 2*n* β^{6} 8.4...9.2

$11^m\ 0^s$ **10054.** α^1 *Capricorni.* **β 295.** (AC = **H 607.**) The faint star was added with the Washington 26-inch. All the other measures of AC are given. Auwers gives the proper motion of the large star, 0″014 in 328°4.

A and B

1875.75	181°8	40″±	1*n*	Hn
1899.43	181.5	43.46	2*n*	β

A and C (= H 607)

1830.56	220°1	44″14	1*n*	Da
1881.85	221.2	44.65	1*n*	Big
1890.52	220.8	44.37	2*n*	Gla
1891.83	221.5	44.65	2*n*	β
1899.43	221.1	44.84	2*n*	β

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3114)(*Pub. L. O.* **II**)... Holden (*Wash. Obsns.* 1875)...Da²...Big...Glasenapp (**I**)...]

11 24 **10057.** α^2 *Capricorni.* **A. G. Clark 12.** (AB = **H 608.**) Herschel's companion was found to be a close double by Alvan G. Clark with the 18½-inch before it was sent to Chicago. H called this star 16 m, but it is readily seen as one star with an aperture of 6 inches. The change, if any, is very slow.

A and BC

1878.55	150°2	7″41	3*n*	β
1881.56	147.9	7.66	4*n*	β
1883.67	150.7	7.48	1*n*	Young
1889.48	146.8	7.75	3*n*	β
1897.58	151.8	7.83	3*n*	Barnard

There is no motion in the close pair:

B and C

1878.52	241°2	1″06	2*n*	β	
1880.08	239.6	0.96	2*n*	β	
1881.54	238.1	1.01	2*n*	β	11.3...11.6
1884.13	239.2	1.29	2*n*	Young	
1886.74	241.2	1.25	2*n*	Hl	
1889.48	239.0	1.19	3*n*	β	11.3...11.5
1903.71	240.5	1.16	4*n*	β	

A distant 9.5 m star measured in β³, 156°2 : 154″43 (1879.45) 2*n*.

[H (**IV, V**)...H²...H (236)...Mh... Mh (*Sid. Mess.* Sept. 1846)...Bru (1164)... Hn (*Wash. Obsns.* 1875).... Newcomb (*Wash. Obsns.* 1875).... Hl (*Wash. Obsns.* 1876, 1886)...Hl (**I, II**)...Hd... Flm...Δ (**II**, p. 585)...Gl (*Observatory* **III**, 508)... Cin⁵...Wilson (Cin¹⁰)...β (*Am. Jour. Sci.* April 1879)...β¹... β²...β³...β⁴...β (2957)(*Pub. L. O.* **II**)...See (3496)...Solá (3679)...A (*Bul. L. O.* No. 11)...β⁶...]

11 24 **10058.** α^2 and α^1 *Capricorni.* **Σ 51, App. I.** (= **H VI. 4** = **Sh 319.**) The proper motions are given by Auwers:

α^2 = 0″040 in 71°1
α^1 = 0.014 in 328.4

1867.72	291°2	376″27	7*n*	Δ
1877.69	291.1	376.17	5*n*	Je
1891.58	291.0	376.37	3*n*	Mai

[Ra (**XXV**)...Lu (**III**)... Flm... Schur (2180)... Δ (1574)... Δ (**II**)...Je (2343)... Big...Maibckato (*Obsns.* 1892)...Solá (3679)...]

11 38 **10059.** **Σ 2659.** (= **H 1497.**) Fixed.

A and B

1864.95	317°7	3″17	3*n*	Δ
1902.50	317.0	3.32	2*n*	Hu

A and C

1867.15	253°7	20″36	3*n*	Δ
1902.50	253.3	20.52	2*n*	Hu

[Ma (*F. S.* **I**, 38, 61)...Ma (**XI**)...H (**IV**)...Se...Δ (**II**)...Cin⁵...]

10060. 32 *Cygni.* **S 743.** (= **H VI. 33** = **σ 669.**) Probably unchanged. The proper motion is insensible, 0″008 in 172°8 (Auwers). $11^m\ 46^s$

1902.51	175°4	208″90	2*n*	β	...8.7

[Bl (**V**)...β⁶...]

10061. **A. G. 251.** Measures from *A. G. Leipzig*, p. 250. 11 51

1901.73	184°3	7″28	2*n*	Ku	8.6...9.6

[Kustner (3821)...]

10062. **H 5512.** "Strongly suspected to be double." I could not find any double here with the 40-inch in 1904. It should be 3′ or 4′ *n* of the 9.5 m star, DM (8°) 4398. 12 1

10063. **β 442.** A multiple star or group, discovered with the 18½-inch, except the extremely faint star *d*, which was detected with the 40-inch in measuring the other stars. This is probably only a perspective group. 12 4

A and B

1879.43	103°7	19″02	1*n*	Cin
1898.60	102.2	18.83	1*n*	β
1899.75	103.0	18.77	4*n*	Doo

B and C

1879.47	48°5	17″41	2*n*	Cin
1898.76	50.6	16.82	1*n*	β
1899.75	49.2	16.84	4*n*	Doo

A and *a*

1879.47	155°3	4″01	2*n*	Cin
1898.60	156.9	3.88	1*n*	β
1899.75	155.7	4.01	4*n*	Doo

A and *b*

1899.76	159°7	8″50	2*n*	Doo

A and *c*

1879.43	331°2	18″88	1*n*	Cin
1898.60	333.2	19.01	1*n*	β
1899.75	333.0	19.23	4*n*	Doo

B and *e*

1898.60	163°7	6″77	1*n*	β
1899.75	164.5	6.85	4*n*	Doo

C and *f*

1879.43	109°4	11″26	1*n*	Cin
1899.75	109.3	12.52	4*n*	Doo

C and *g*

1879.43	116°1	20″52	1*n*	Cin
1899.75	117.0	20.50	4*n*	Doo

C and *h*

1899.75	306°6	15″02	4*n*	Doo

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)(*Pub. Y. O.* **I**)...Cin⁵...Doolittle (*Pub. Flower Obsy.* **I**)...]

(See p. 1082)

12^m 7^s **10064.** **Ho 588.** Nothing later but the following:

BC	1902.34	14°1	9″26	2*n*	Doo
AB	1902.34	297.8	51.27	3*n*	Doo

[Ho (3557)...]

12 9 **10066.** **Ho 455.** The only later measures are:

AB	1904.62	82°3	33″41	4*n*	Doo
BC	1904.61	183.4	3.08	3*n*	Doo
AD	1904.62	256.7	32.98	4*n*	Doo
AE	1904.62	76.1	37.27	4*n*	Doo

[Ho (3234)...]

12 13 **10067.** **A 284.** No later measures.

[A (3784)(*Bul. L. O.* No. 16)...]

12 20 **10069.** **Ho 590.** Change in AB?

1901.73	204°2	3″63	3*n*	Doo

[Ho (3557)...]

(See p. 1082)

12 28 **10070.** *σ Capricorni.* **Sh 380.** (= **H** V. 87 = *σ* 668.) The smaller star seems to share the proper motion of the other, 0″020 in 293°5 (Auwers).

1782.67	175°2	50″12	1*n*	H	
1823.69	176.4	53.70	1*n*	Sh	
1881.59	177.2	55.81	3*n*	*β*	5.0...8.3
1896.64	177.9	55.74	3*n*	Lv	
1901.67	177.7	55.90	2*n*	*β*	

[*β*^{4}...Lv (*A. J.* 407)...*β*^{5}...]

12 30 **10071.** **Σ 2663.** (= **S 744.**) No change.

1868.55	324°3	5″25	4*n*	*Δ*
1905.47	324.6	5.27	1*n*	*β*

[Ma (*F. S.* **I**)....Ma (**XI**)....Ra (**XXV**)....Du....*Δ* (1209)....*Δ* (**II**)....Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...*β*^{6}...]

12 31 **10072.** **β 984.** Discovered with the 18½-inch. Slow direct motion in angle. All the measures are given:

1880.47	204°1	0″86	2*n*	*β*
1883.70	199.8	0.63	3*n*	Ho
1888.49	203.1	....	1*n*	Lv
1890.85	207.5	0.73	7*n*	Sp
1901.78	211.8	0.70	2*n*	A
1903.02	212.0	0.88	4*n*	Doo

[*β* (**XIII**)...*β*^{3}...Ho (2978)...Lv^1...Sp (**III**)...A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12 33 **10073.** **Ho 591.** Nothing later but the following:

1901.74	293°9	2″28	5*n*	Doo

[Ho (3557)...]

10074. **OΣ 404** *rej.* No measures by OΣ; rejected in second edition of *Poulkowa Catalogue.* No change. 12^m 34^s

1898.63	114°7	29″88	3*n*	Hu

[Ma (**XI**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

10075. **Hu 585.** A later measure: 12 34

1903.50	52°4	4″22	1*n*	Lewis

[Hu (*Bul L. O.* No. 27)...Lewis (*Mon. Not.* **LXIV**, 804)...]

10076. **β 441.** Discovered with the 18½-inch. Without change. 12 37

1877.68	67°6	5″74	2*n*	*Δ*
1878.58	67.5	6.07	1*n*	OΣ
1880.47	65.7	5.67	1*n*	*β*
1883.62	65.5	6.10	2*n*	HΣ
1893.51	65.6	5.93	3*n*	Lv
1896.80	66.3	5.70	3*n*	Morgan
1900.59	66.8	5.81	4*n*	Doo

[*β* (**VIII**)...*β* (*Am. Jour. Sci.* July 1877)...*β*^{3}...*Δ* (**I**)... HΣ (**XII**)...OΣ (**X**)... Lv (*A. J.* 382)....Morgan (*A. J.* 439)....Doolittle (*Pub. Flower Obsy.* **I**)....]

10077. **β 661.** *Cygni* **166.** Discovered with the 18½-inch. The Harvard photometric magnitude is 5.5. B. A. C. 6986. The principal star is given a proper motion of 0″022 in 113°5 (Kustner), and the companion seems to have the same. 12 39

1878.52	67°0	12″60	2*n*	*β*	6.2...12.5
1884.56	66.5	12.81	2*n*	HΣ	
1891.50	65.1	12.99	3*n*	*β*	5.8...12.2
1903.05	65.9	12.99	3*n*	Doo	5.7...12.4

[*β* (**X**)....*β*^{1}.... *β* (3114)(*Pub. L. O.* **II**).... HΣ (**XII**) .... Doolittle (*Pub. Flower Obsy.* **II**)...]

10081. **Σ 2662.** Without change. The measure in Se belongs to some other star, or distance misprinted. 12 50

1867.42	41°8	1″65	5*n*	*Δ*
1894.83	40.3	2.16	1*n*	Cal
1902.48	41.0	1.69	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X**)... Se.... *Δ* (**II**)...WS^2...*β*^{1}... Callandreau (*Bul. Ast.* **XII**, 523)...]

10082. **Howe 53.** Fixed. 12 51

1896.84	186°0	4″03	2*n*	See	9.2...10.0

[Cin^3...Cin^4...Cin^5...Wilson (Cin^{10})...Glasenapp (**I**)...See (3496)...]

10084. **H 912.** In H (V) it is given, 77°4 : 3″ : 11...11. The only later measure is: 12 55

1904.45	75°3	4″73	2*n*	*β*^{6}	9.7...9.9

A and DM (19°) 4359

1904.45	169°2	86″62	2*n*	*β*^{6}	...9.1

12^m 56^s **10085.** *κ Cephei.* **Σ 2675.** (= **H** III. 70 = **Sh 321.**) Fixed. The components have a common proper motion of 0″018 in 24°3 (Auwers).

1868.26	123°9	7″38	5*n*	Δ
1877.66	122.5	7.47	10*n*	Hl
1891.88	124.6	7.33	17*n*	Com
1899.75	122.8	7.50	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... Wr... Se... OΣ (**IX, X**)... Ra (**XXII**)... Δ (1209)... Δ (**I**, p. 405)... Δ (**II**)... WS... Pk... Hl (*Wash. Obsns.* 1876)... Hl (**I**, p. 22)... Cin^4... Cin^5... En (2662)... Com (**VI**)... de Ball (3017)... Glasenapp (**I, III**)... Maw (**I**)... Com (**X**)...]

12 58 **10086.** **H 5188.** Without change. Glasenapp measures a wide pair in the field, 13^s *p* and 4′ *n*, 197°7 : 53″68 : 7.2...9.1 (1890.55) 2*n*.

A and B

1877.54	63°7	4″73	2*n*	Cin	7.5...9.5
1896.84	58.8	4.11	2*n*	See	
1905.80	60.9	4.66	3*n*	Doo	7.5...9.5

A and C

1877.66	321°3	27″60	1*n*	Cin	...8.0
1890.54	322.0	26.75	2*n*	Gla	
1905.80	321.4	27.44	3*n*	Doo	...8.3

[Cin^3... Cin^4... Cin^5... Glasenapp (**I**)... See (3496)...]

13 1 **10087.** **H 1500.** "Two more stars 13 m, distant about 15″." The only measures are:

AB	1904.44	74°8	10″98	1*n*	β^6	9.1...10.3
AC	1904.44	315.7	30.19	1*n*	β^6	...12.5
AD	1904.44	337.9	37.74	1*n*	β^6	...12.0

13 9 **10089.** **See 414.** The R. A. in See is 1^m too small.

1899.67	51°6	2″18	3*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 486)... Scott (*Mon. Not.* **LXIV**, 52)...]

13 12 **10090.** **β 985.** (AC = **H 1499.**) Discovered with the 18½-inch. All the other measures are given:

A and B

1898.83	146°8	4″72	2*n*	A	6.8...13.5
1901.61	148.0	5.02	2*n*	Doo	7.2...13.0

C and D

1893.59	61°8	8″89	3*n*	W
1901.60	65.4	9.77	3*n*	Doo

A and C (= H 1499)

1828	358°4	15″ ±	1*n*	H^2	8 ...13
1893.58	356.4	21.54	3*n*	W	
1898.83	355.8	21.62	2*n*	A	
1901.60	356.3	21.75	3*n*	Doo	

[β (**XIII**)... β^3... Wilson ( )... A (3585)... Doolittle (*Pub. Flower Obsy.* **II**)...]

13 18 **10091.** **Barnard 11.** (AC = **Ho 592.**) The principal star of Ho 592 was found to be a close pair with the 40-inch. The following are all the other measures:

A and B

1899.55	198°5	0″33	3*n*	Hu
1899.75	196.3	0.31	5*n*	A
1905.71	195.6	0.32	3*n*	Doo

AB and C

1895.77	256°1	2″77	2*n*	Ho
1899.75	257.2	2.92	5*n*	A
1905.69	252.7	3.02	2*n*	Doo

[Ho (3557).... Barnard (*A. J.* 447).... A (3585)(*Bul. L. O.* No. 11).... Hu (*Bul. L. O.* No. 44)...]

(See p. 1082)

10093. **Kr 49.** Double in *A. G. Hels.* No change. 13^m 29^s

1898.41	114°8	1″74	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10094. **A. G. 252.** Double in *A. G. Lund.* Measures by β^6. 13 31

10095. **A 285.** No other measures. 13 33

[A (3784)(*Bul. L. O.* No. 16)...]

10096. **Σ 2667.** (= S 746.) No change. 13 37

1865.72	225°2	7″98	3*n*	Δ
1902.48	224.6	8.02	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII**)... H (**IV**)... Se... Ferr... Δ (**II**)... Glasenapp (**IV**)...]

10097. **Σ 2661.** No change. 13 38

1866.67	341°5	24″39	3*n*	Δ
1902.43	341.0	24.62	2*n*	Hu

[Ma (*F. S.* **I**)... H (**V, VII**)... Mh... Δ (**II**)... T (2991, 3185)... *Annals Toulouse Obsy.* **III**...]

10098. **H 1501.** "Double-double." The only measures are: 13 42

AB	1904.44	358°1	12″63	1*n*	β^6	9.4...10.3
CD	1904.44	10.3	18.61	1*n*	β^6	10.0...12.0
AC	1904.44	351.6	57.95	1*n*	β^6	

10099. **Σ 2665.** Fixed. 13 46

1867.68	17°8	3″15	4*n*	Δ
1879.48	16.7	3.47	4*n*	Sp
1902.44	18.0	3.32	2*n*	Hu

[Ma (*F. S.* **I**).... Ma (**X**).... Se.... Δ (**II**).... Per.... Sp (**II**).... T (2991).... *Annals Toulouse Obsy.* **III**... Bowyer (*Mon. Not.* **LXVI**, 30)...]

10100. **Σ 2666.** *Cygni* 172. Apparently fixed. There are several faint stars in the field. One of them 9.2 m is measured by T, 208°5 : 33″68 (1887.87) 3*n*. 13 52

1865.75	245°0	2″58	3*n*	Δ
1884.74	245.0	2.67	8*n*	Per
1890.25	243.4	2.88	2*n*	HΣ
1902.49	246.8	2.84	3*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI, XIII, XV**)... Da^2... Se... Du... Flm... Bl (**V**)... Big... WS... WS^2... Gl... Per... Per (2559)... T (2899)... Hl (**II**)... Collins (*Proc. Haverford Coll. Obsy.* 1891)... Δ (**II**)... Glasenapp (**III**)... Knorre (3518)... *Annals Toulouse Obsy.* **III**... HΣ (**XII**)... Furner (*Mon. Not.* **LXVI**, 30)...]

14^m 0^s **10102.** **Σ 2664.** (= **S 744.**) Fixed.

1866.17	322°3	27″80	3*n*	Δ
1886.62	322.2	27.70	4*n*	Per
1902.44	320.7	27.72	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)... H (**IV**)... Ra (**XXV**)... Δ (1209)... Δ (**I, II**)...Per... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

14 0 **10103.** **OΣ 405.** Apparently fixed.

1869.82	145°8	0″67 ±	5*n*	Δ
1889.87	147.9	0.64	5*n*	Sp
1898.85	147.4	0.73	3*n*	Hu
1901.60	150.4	0.79	3*n*	Doo

[OΣ (**IX**)... Δ (I)... Big... En (2678)... Big (*Bul. Ast.* **XII**, 299)... HΣ (**XII**)... Hu (*Pub. L. O.* **V**)... Do (3931)... Sp (**III**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

14 0 **10104.** *ν Capricorni.* **Lamont 5.** From Mu. There is an error of 180° in the angle. The principal star has a proper motion of 0″024 in 257°9 (Auwers). These are the only measures:

1877.77	210°1	55″38	1*n*	β^1	...12.5
1901.67	210.6	54.06	2*n*	β^5	...11.0

14 0 **10105.** **β 662.** Discovered with the 18½-inch. This is the most northern of two small stars 2′7 apart. A 7½ m star 28^s *p* and 2′6 *s*.

1902.66	299°8	1″49	4*n*	Doo
1903.66	297.6	2.03	2*n*	β

[β (**X**)... β^1...Cogshall (*A. J.* 478)... Doolittle (*Pub. Flower Obsy.* **II**)... β^6...]

14 2 **10106.** β^1 *Capricorni.* **Barnard 12.** Discovered by Barnard during an occultation of this star by the moon in 1883. Apparently no change. The following are all the measures:

1884.59	105°8	0″85	3*n*	β
1885.73	106.1	0.89	4*n*	Young
1886.72	109.6	0.83	2*n*	Ho
1886.77	106.2	1.07	2*n*	LM
1888.99	106.8	0.87	7*n*	β
1893.27	103.1	1.16	8*n*	Barnard

[Barnard (*Sid. Mess.* **II**, 290; **III**, 25, 120, 217)(*A. N.* 2588, 2625)(*A. J.* 447).... Sawyer (*Sid. Mess.* **II**, 312).... Todd (*Sid. Mess.* **III**, 91).... Ho (*Sid. Mess.* **V**, 285)... Ho (2978)...LM...β (2875, 3114)(*Pub. L. O.* **II**)...]

14 9 **10108.** **H 2951.** No motion.

1876.10	126°2	10″68	3*n*	Δ (I)	8.3...8.7
1905.76	125.9	10.82	1*n*	β^6	

14 10 **10109.** **A 286.** (AC = **β 986.**) The close pair was discovered by Aitken with the 36-inch. No change in the more distant companion. These are all the later measures:

1892.72	240°6	4″20	3*n*	W	8.5...11.8
1901.61	238.5	4.53	4*n*	Doo	8.1...11.4
1901.76	239.7	4.31	3*n*	A	8.5...12.3

[β (**XIII**).... β^3....Wilson ( )... A (3784)(*Bul. L. O.* No. 16) (*Pub. A. S. P.* **XIII**, 243)...Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

10111. **H 2948.** "A very minute star forming a triangle with β^1 and β^2 *Capricorni.* Position from β^1 = 63°4; from β^2 = 296°0. It is one of the most minute and delicate double stars I have seen." The following are all the measures: 14^m 15^s

1891.66	322°3	6″42	2*n*	β	13.0...13.4
1900.73	321.1	5.32	1*n*	A	13.0...13.5
1903.73	320.3	6.75	1*n*	β	13.0...13.3

β^2 *Cap.* and H 2948 (A)

1891.66	294°0	111″70	2*n*	β

[H (**VII**).... β (3114)(*Pub. L. O.* **II**)(*Ast. and A.-P.* **XI**, 173).... A (*Bul. L. O.* No. 11)... β^6...]

10112. β^2 **and** β^1 *Capricorni.* **Σ 52, App. I.** (= **H̥ VI. 28** = **S 745.**) Without change. β^1 is a close pair (No. 10106). The proper motion of β^2 is very small, 0″016 in 38°0 (Auwers), and the other seems to have the same movement. 14 16

1869.53	267°1	205″31	5*n*	Δ
1891.60	267.1	205.36	3*n*	Mai
1903.76	266.9	205.25	4*n*	β

The principal star is supposed to be a spectroscopic binary, Campbell (*Astrophysical Jour.* X, 241).

[Ra (**XXV**)...Pk... Δ (**II**)...Je (2343)...Maiebckato (*Obsns.* 1892)... β^6...]

10113. **Schj. 25.** From list of new pairs by Schjellerup (1485). No motion. 14 20

1899.83	215°1	2″64	2*n*	A	8.0...9.1
1904.57	219.3	2.80	3*n*	Doo	8.0...8.9

[Δ (I)... Cin^5... Lv^1... LM... A (3639)... Doolittle (*Pub. Flower Obsy.* **II**)...]

10115. **β 1206.** Discovered with the 36-inch. The other measures are: 14 36

1897.74	359°7	1″80	1*n*	Lewis
1897.83	355.6	2.25	1*n*	A
1897.99	365.6	2.14	1*n*	Brown

[β (**XVII**)....β (3047)(*Pub. L. O.* **II**).... A (*A. J.* 429)... Lewis (*Mon. Not.* **LIX**, 400)... Brown (3646)...]

10116. **Ho 125.** Probably fixed. 14 36

1893.71	191°0	3″31	1*n*	Ho
1901.76	192.7	3.31	7*n*	Doo

[Ho (2779, 3234)...]

10118. **Ho 124.** No motion. 14 43

1893.73	358°5	0″77	1*n*	Ho
1895.05	3.8	0.81	3*n*	Ho
1904.64	0.4	0.92	3*n*	Doo

[Ho (2779, 3234, 3558)...]

10120. **A. G. 253.** Double in *A. G. Lund.* Measures by β^6. 14 46

$14^m\ 54^s$ **10121.** **Ho 126.** No motion.

1893.71	149°6	2″82	1*n*	Ho
1901.42	327.8	2.85	6*n*	Doo

[Ho (2779, 3234)...]

14 56 **10122.** **Arg. 37.** "Duplex, 20″" in O. Arg. N. From Cin^5. Since Part I was in type I have looked this up, and find that the measures given from Cin^5 do not belong to this star. My measures give:

1905.42	195°0	15″47	2*n*	β^6	9.0...11.8

It is now evident that the place given in Cin^5 has an error of over 2^h R. A. and about 15′ in declination, and that the pair measured was Σ 2902 (see No. 11702).

15 1 **10126.** **Kr 50.** "Duplex" in *A. G. Hels.* There is an error of 180° in the angle given in Part I.

1899.30	130°0	2″35	7*n*	Doo

[β (3042)(*Pub L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

15 6 **10127.** **See 416.** Later measures:

AB	1899.67	247°6	1″14	3*n*	Cg	8.7... 8.7
AC	1899.67	254.7	27.10	3*n*	Cg	...12.8

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

15 14 **10128.** **Hn 158.** No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

15 14 **10129.** **Ho 277.** The later measures are:

1896.72	66°3	2″67	1*n*	Ho
1902.62	72.3	3.00	4*n*	Doo

[Ho (2977, 3558)...]

15 16 **10130.** **H 2953.** "Delicate and difficult." Nothing since but the following:

1905.05	260°9	25″35	2*n*	β^5	8.7...10.7

15 23 **10131.** **♅ N. 138.** No measures by ♅. Unchanged since my measures of 1878. The first mention of this pair after ♅ is by Peters, who found it in observing an asteroid.

1901.60	331°3	3″08	2*n*	β	8.0...8.6

[Peters (1635)...β^1...Cin^5...Boeger (*A. J.* 522)...β^5...]

15 25 **10133.** **Arg. 38.** "Duplex" in O. Arg. Measures from Cin^5 and Cin^6. (See p. 1082)

15 25 **10134.** **β 431.** Discovered with the 6-inch. Change uncertain.

1884.25	42°4	0″72	3*n*	HΣ	
1884.84	53.1	0.42	7*n*	En	8.0...8.5
1889.53	38.2	0.66	4*n*	β	8.6...8.6
1898.60	38.0	0.75	4*n*	A	8.4...8.5

[β (**VII**)....β (2103, 2957)(*Pub. L. O.* **II**)....Δ (I)....En (2742)....HΣ (**XII**)....A (3585)...]

10135. **Σ 2671.** (= **♅ I. 95 = Sh 320**) These stars have a common proper motion of 0″814 in 270° (*A. G. Harvard*). No sensible change. $15^m\ 2$

1868.31	341°2	2″88	4*n*	Δ
1894.87	338.7	3.07	3*n*	Maw
1902.48	340.2	3.28	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Ra (**XXVIII**)...Wr (*Phil. Trans.* 1851)...Wr....Δ (*Mem. Accad. Sci.*)....Δ (1032)....Δ (**I, II**)....Maw (**II**)....Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

(See p. 1082)

10136. **OΣ (App) 205.** Relatively fixed. 15 30

1905.40	319°5	45″31	3*n*	β

[Δ (I)...Franz (3080)...β^6...]

10137. **H 2954.** Nothing since H but the following: 15 30

1904.46	303°1	2″88	2*n*	β^6	9.5...9.5

10138. **Ho 593.** No change. 15 39

1904.51	313°4	4″72	3*n*	Doo

[Ho (3558)...]

10139. *κ² Sagittarii.* **β 763.** Discovered with the 6-inch at Mt. Hamilton in 1879. The Cordoba magnitude is 5.6. Probably unchanged. All the other measures are given: 15 43

1887.38	213°3	0″93	1*n*	Pollock
1893.49	214.3	0.78	3*n*	Sellors
1897.78	195.1	1.40	1*n*	See
1898.58	212.9	1.00	3*n*	A

[β (**XI**)...β^2...β (2957)(*Pub. L. O.* **II**)...Pollock (*Pub. Sydney Obsy.* 1891)(*Mon. Not.* **XLVII**, 473)(*Mem. R. A. S.* **L**)...Sellors (3154, 3303)...A (3585)...]

10140. **Σ 2668.** There may be a little change in the angle. 15 54

1868.44	289°7	3″13	4*n*	Δ
1888.79	288.2	3.34	3*n*	HΣ
1902.48	287.1	3.33	2*n*	Hu

[Ma (*F. S.* I)...Ma (**XI, XV**)...Se...WS...WS^2...Gl...Flm...Δ (**II**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Bowyer (*Mon. Not.* **LXVI**, 30)...]

(See p. 1082)

10141. **OΣ 406.** (= **β 362** *rej.*) Binary in very slow motion. The only certain change is in the angle. 15 54

1845.81	136°3	0″54	3*n*	OΣ
1845.82	133.3	0.25	1*n*	Ma
1855.15	122.5	0.53	2*n*	OΣ
1867.05	121.1	0.77	1*n*	Δ
1872.59	115.9	0.5±	5*n*	Δ
1876.16	114.2	0.44	6*n*	Δ
1876.80	112.9	0.45±	2*n*	Sp
1877.03	111.9	0.34	2*n*	Δ
1879.73	107.9	0.49	4*n*	Hl
1885.70	107.7	0.51	6*n*	Hl
1886.56	110.3	0.47	2*n*	Per
1887.51	108.9	0.49	5*n*	Sp
1898.51	100.3	0.39	3*n*	Hu
1903.67	96.9	0.36	1*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX**)...Flm...Δ (I)...β (**VI**)...WS^2...Sk...Sk^3...Do (2303)...Per...Sp (2133)...Sp (**II, II** App.)...β (2062)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (**I, II**)...Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Biesbroeck...]

(See p. 1082)

$15^m 59^s$ **10142.** **H 2956.** The only observation since H is:

1902.51	246°5	8″10	2*n*	β^6	10.9...11.0

16 15 **10143.** **See —.** Discovered by See at the Lowell Observatory, and erroneously stated to be given as double in O. Arg. S.

1900.38	108°2	2″43	3*n*	Doo	8.5...9.1

[See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...Doolittle (*Pub. Flower Obsy.* **I**)...]

16 18 **10144.** **Ho 456.** Change in angle?

1897.13	212°2	14″42	3*n*	See
1904.71	210.1	14.10	3*n*	Doo

[Ho (3234)...See (3496)...]

16 25 **10146.** **β 1207.** Discovered with the 36-inch. One of the Wolf-Rayet stars in *Cygnus*.

1898.66	215°7	5″83	3*n*	A
1900.86	220.0	5.87	2*n*	Doo

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

16 25 **10147.** **Σ 2672.** Probably a physical pair, but the change is very slow, and only in angle so far. All the measures are given here.

1831.80	278°4	1″07	3*n*	Σ
1845.75	280.7	0.95	1*n*	Ma
1856.72	280.9	0.80	2*n*	Se
1869.47	284.8	0.95	5*n*	Δ
1879.39	292.0	0.7 ±	1*n*	Cin
1887.39	294.4	1.02	3*n*	HΣ
1894.69	306.4	0.94	2*n*	Gla
1902.51	296.8	0.83	3*n*	Hu

[Ma (*F. S.* **I**)...Se...Δ (**II**)...Cin⁵...Glasenapp (**III**)...HΣ (**XII**)...]

16 27 **10148.** **β 1259.** Discovered with the 36-inch. It is 11^s *p* a 7m star. The other measures are:

1895.01	172°9	0″37	5*n*	Sp
1898.60	167.5	0.63	3*n*	A

[β (**XVIII**)...β (3113) (*Pub. L. O.* **II**)...Sp (**III**)...A (3585)...]
(See p. 1082)

16 33 **10149.** **β 1260.** Discovered with the 36-inch. This is 18′ *n* of Σ 2761. The only other measure is:

1899.71	164°1	0″48	2*n*	A

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3639)...]
(See p. 1082)

16 35 **10150.** **Ho 127.** The only other positions are:

1895.69	85°3	1″42	2*n*	Ho
1901.75	88.0	1.70	5*n*	Doo

[Ho (2779, 3558)...]

16 36: **10151.** **H N. 138.** Error in Herschel's place (see No. 10131).

10154. **Σ 2670.** (= **S** 747.) Fixed. $16^m 42^s$

A and B

1867.05	151°4	30″49	3*n*	Δ
1895.63	151.6	30.45	2*n*	Gla
1902.50	151.8	30.40	2*n*	Hu

B and C

1867.05	77°8	16″45	3*n*	Δ
1895.63	77.5	16.81	2*n*	Gla
1902.50	77.0	16.38	2*n*	Hu

[Ma (*F. S.* **I**, pp. 38, 61)...Ma (**XI**)...H (**V**)...Δ (**II**)...Cin⁵...Glasenapp (**IV**) ...*Annals Toulouse Obsy.* **III**...]

10155. **Σ 2669.** No change. The 40-inch shows a 13.5m star, 167°: 17″7. 16 56

1866.63	260°1	23″39	3*n*	Δ
1904.44	260.0	23.35	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**III**)...β⁶...]

10156. **A 287.** No other measures. 16 56

[A (3784)(*Bul. L. O.* No. 16)...]

10157. **See 418.** Later measures: 17 0

1898.98	53°7	2″78	2*n*	Cg	8.5...11.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10158. **A 725.** No other measures. 17 0

[A (*Bul. L. O.* No. 61)...]

10159. **A 46.** No other measures. 17 1

[A (3585, 3635)(*Bul. L. O.* No. 16, p, 138)...]

10160. **Σ 2673.** (CD = **Σ** 2674.) No change in any of the stars in the last seventy years. 17 6

A and B (= Σ 2673)

1867.02	332°2	2″52	3*n*	Δ
1882.65	331.7	2.55	5*n*	Hl
1895.85	330.5	2.64	3*n*	A
1902.51	330.1	2.67	3*n*	Hu

C and D (= Σ 2674)

1867.02	1°8	15″44	3*n*	Δ
1895.85	359.8	15.95	3*n*	A
1902.50	1.7	15.46	2*n*	Hu

A and C

1867.02	104°5	76″01	3*n*	Δ
1895.85	103.6	75.65	3*n*	A
1902.50	103.1	75.88	2*n*	Hu

[Ma (*F. S.* **I**, pp. 38, 194)...Ma (**X, XI, XIII, XV**)...H (**IV**)...Se...WS...WS² ...Gl...Flm...Big...Δ (**II**)...Hl (**I, II**)...Hl (*Wash. Obsns.* 1884)...Glasenapp (**III**)...A (3396)...*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...]

10162. **H 1505.** In W² 8m, and so I found it in 1876. 17 10

1900.53	116°9	16″84	1*n*	Es	8.3...10.5

[Espin (*Mon. Not.* **LXIV**, 679)...]

17^m 19^s **10163.** **β 663.** The faint star, C, was discovered with the 18½-inch, and in measuring that with the 36-inch a still nearer companion was detected. This is a difficult object with a large aperture. The proper motion is 0″092 in the direction of 270° (*A. G. Harvard*).

A and B

1898.67	311°4	7″80	1*n*	A

A and C

1877.57	79°4	8″3±	1*n*	β
1885.52	77.5	7.80	2*n*	HΣ
1898.67	76.7	7.60	1*n*	A

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...HΣ (**XII**)...A (3585)...]

17 28 **10164.** **H 1504.** "C est. from diagram." Examined and both distances appeared to be greater, B at least 20″, and the angle of C less than B (1876). Recently measured:

AB	1904.30	248°5	22″48	2*n*	β^6	7.5...11.0
AC	1904.30	227.0	51.81	2*n*	β^6	...10.2

17 33 **10165.** **H. C. Wilson 19.** Identified as given in Part I.

1901.62	0°0	2″09	2*n*	β^5	9.5...9.5

17 49 **10166.** **Σ 2676.** Fixed.

1866.68	170°1	2″40	3*n*	Δ
1902.51	171.7	2.63	2*n*	Hu

[Ma (**XI, XII, XIII**)...Ma (*F. S.* **I**)...Δ (**II**)...WS^2...]

17 50 **10167.** **A 288.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

17 55 **10168.** *γ Cygni.* **β 665.** The distant double companion was discovered with the 18½-inch. There are several small stars nearer A than this. Auwers gives the proper motion of *γ Cygni* 0″011 in the direction of 295°8. The measure of Mitchel in Cin^2, ascribed to *γ Cygni*, really belongs to *β Cygni*.

B and C

1891.53	302°0	1″78	3*n*	β
1898.55	300.2	1.86	3*n*	A

A and BC

1891.53	196°4	141″13	3*n*	β
1898.54	196.2	141.32	1*n*	A

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...A (3585)...]

18 31 **10170.** **Σ 2677.** (= **Ħ V. 35.**) No change.

1866.64	28°9	32″94	3*n*	Δ
1898.56	29.9	32.50	2*n*	Gla
1902.52	28.9	32.82	2*n*	Hu

[H (**V, VII**)...Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...Glasenapp (**V**)...]

18 31 **10171.** **H 1510.** (AC = **Espin 29.**) "A very neat star."

AB	1900.61	149°8	4″33	2*n*	Espin	8.9... 9.0
AC	1900.70	339.9	6.31	3*n*	Espin	...13.3
AD	1900.61	322.9	31.75	2*n*	Espin	...10.2

[Espin (*Brit. Ast. Ass'n* **III**, 228)(*A. N.* 3717)...]

10173. **OΣ (App) 206.** B is W^2 XX. 641. Unchanged. 18^m 35^s

1905.42	256°5	42″62	2*n*	β

There is a small star nearly midway between A and B:

A*a*	1905.42	262°0	23″35	2*n*	β	...11.2

[Δ (**I**)...Franz (3080)...β^6...]

10174. **H 1506.** The distances appeared much larger than H's estimates (1876). Later measures give: 18 35

AB	1902.48	201°7	8″96	2*n*	β	8.5...11.0
AC	1902.48	193.6	32.82	2*n*	β	...10.6

[Espin (*Mon. Not.* **LXII**, 533)...β^6...]

10175. **A 726.** No other measures (*Bul. L. O.* No. 61). 18 36

10176. **β 664.** *Aquilae* **264.** Discovered with the 18½-inch. Probably without change. Lalande 39236. HΣ mentions a 12m star, 9°2 : 20″. 18 36

1885.13	289°0	8″78	4*n*	HΣ
1893.66	290.0	8.90	3*n*	Wilson
1896.71	287.0	8.76	1*n*	Lv
1898.68	288.2	8.90	3*n*	A

[β (**X**)...β^1...Lv (*A. J.* 407)...Wilson ( )...A (3585)...HΣ (**XII**)...]

10179. **A 289.** No other measures. 18 43

[A (3784)(*Bul. L. O.* No. 16)...]

10180. **Ho 128.** (AC = **OΣ (App) 207.**) Close pair discovered by Hough. Unchanged. This star is given a proper motion of 0″061 in 56°2 (Kustner). The following are all the other measures: 18 47

A and B

1895.48	26°0	1″02	4*n*	Ho
1900.66	26.0	1.02	1*n*	Lewis
1901.85	22.4	1.12	2*n*	A
1904.57	26.8	1.12	3*n*	Doo

A and C

1886.66	63°1	95″62	4*n*	Franz

[Ho (2779, 3558)...Δ (**I**)...Franz (3080)...Lewis (*Mon. Not.* **LXI**, 486)...]

(See p. 1082)

10182. **Σ 2679.** Perhaps change in distance. 18 59

1865.27	79°0	22″11	3*n*	Δ
1895.61	78.4	22.75	2*n*	Gla
1902.58	78.7	22.73	2*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...Glasenapp (**IV**)...*Annals Toulouse Obsy.* **III** ...β^6...]

10185. **H 1508.** "Est. from diagram. A strongly suspected to be double." Not in DM. Nothing later but the following: 19 3

1902.47	65°5	10″21	2*n*	β^6	10.4...10.7

19^m 9^s **10187.** **β 666.** Discovered with the 18½-inch. Probably fixed.

1877.58	121°4	1″7 ±	1*n*	β
1892.82	121.6	1.58	1*n*	Ho
1902.70	122.5	2.00	4*n*	Doo

[β (X)...β^1...Δ (I)...Ho (3234)...Doolittle (*Pub. Flower Obsy.* II)...]

19 12 **10188.** **β 443.** Discovered with the 18½-inch. The later measures show no change. The 40-inch shows a faint star in the direction of B, which is nearer than C.

A and B

1878.58	132°9	13″30	1*n*	OΣ
1892.81	133.2	13.16	2*n*	Wilson
1898.51	136.2	13.64	[illegible]	β

A and C

1892.81	88°8	35″18	2*n*	Wilson
1898.51	89.2	35.38	2*n*	β

[β (VIII)....β (*Am. Jour. Sci.* July 1877) (*Pub. Y. O.* I)....OΣ (X)....Wilson ( )...]

19 14 **10189.** **Σ 2680.** Possibly a little increase in distance.

1865.99	288°4	15″95	3*n*	Δ
1894.54	288.2	16.04	3*n*	Gla
1902.51	287.9	16.27	2*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Cin^5... Glasenapp (III)... *Annals Toulouse Obsy.* III...]

19 15 **10190.** **Howe 54.** Place and measures from Ho.

1897.15	52°1	2″21	3*n*	See	8.5...9.6

[Cin^6...Wilson (Cin^{10})...Ho (*A. J.* 215)(3234)... See (3496)... Scott (*Mon. Not.* LXIV, 52)...]

19 21 **10191.** **Σ 2678.** Probably fixed.

1866.96	315°5	3″62	3*n*	Δ
1892.71	315.3	3.52	1*n*	Gla
1902.53	314.9	3.53	1*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...Se...Δ (II)...Glasenapp (II)...Solá (3679)...]

19 25 **10192.** **Ho 457.** The only measures are:

A and B

1903.99	242°6	2″43	3*n*	Howard	9.2...9.4
1904.54	61.0	1.96	2*n*	Bowyer	8.1...8.1
1904.59	61.1	2.25	3*n*	Doo	

A and C

1904.59	269°7	27″00	2*n*	Doo

[Ho (*A. J.* 215)(3234)...Bowyer (*Mon. Not.* LXVI, 30)...]

19 25 **10193.** **H 1512.** "A coarse double 8m, *p*." This is probably AC of β 443.

10194. **β 1134.** Discovered with the 36-inch. A naked-eye star in *Cepheus*, but not given as such by Heis and Argelander. The Harvard photometric magnitude is 5.8. No other measures. 19^m 29^s

[β (XVI)...β (2956)(*Pub. L. O.* II)...]

10195. **A 727.** A later observation (*Bul. L. O.* No. 61), the mean being: 19 35

1904.45	64°9	0″48	3*n*	A

10196. **Σ 2681.** AB fixed, but slow change in the distant companions from proper motion. 19 35

A and B

1867.30	41°0	6″66	3*n*	Δ
1904.56	39.3	6.66	2*n*	β

A and C

1867.30	202°9	41″32	3*n*	Δ
1904.56	202.1	40.41	2*n*	β

C and D

1867.30	102°7	22″19	3*n*	Δ
1904.48	102.3	22.71	1*n*	β

[Ma (XI, XIII)...Ma (*F. S.* I, pp. 61, 194)...Δ (II)...β^6...]

10198. **A. G. 254.** Double in *A. G. Leiden.* Measures by β^6. 19 46

10200. **A 728.** With later measures (*Bul. L. O.* No. 61): 19 51

1904.52	339°8	0″37	3*n*	A	8.9...9.4

10202. **H. C. Wilson 20.** From Wilson (Cin^{10}). There seems to be a large error in the place, and there is no doubt of its identity with No. 10234. 20

10203. **β 432.** Discovered with the 6-inch. Without relative change. 20 12

1878.65	199°6	1″34	1*n*	OΣ
1892.72	197.8	1.44	3*n*	Wilson
1897.79	192.7	1.35	1*n*	Brown
1898.60	196.1	1.44	4*n*	A
1901.59	196.2	1.41	3*n*	Doo

[β (VII)...β (2103)...Δ (I)...OΣ (X)...Wilson ( )...A (3585)...Brown (3446)...Doolittle (*Pub. Flower Obsy.* II)...]

10204. **A 290.** No other measures. 20 14

[A (3784)(*Bul. L. O.* No. 16)...]

10207. *π Capricorni.* **β 60.** (AC = **β 296.**) The close pair was discovered with the 6-inch in 1871, but there is an earlier observation by Mitchel at Cincinnati, not published until 1876. The principal star has a proper motion of 0″017 20 27 in 313°2 (Auwers). If the smaller star was fixed, the distance should increase about 0″8 in the time covered by the measures. The distant star was added with the Washington 26-inch.

A and B

1846.70	145°1	2″85	5*n*	Mh
1871.80	144.9	3.15	3*n*	Kn
1877.40	145.4	3.35	5*n*	Cin
1880.72	145.4	3.31	2*n*	Pt
1888.25	146.0	3.43	4*n*	T
1888.60	146.2	3.49	6*n*	Lv
1889.69	145.1	3.43	2*n*	Hl
1897.74	146.5	3.45	2*n*	See
1898.51	144.2	3.15	3*n*	Doo
1898.56	144.2	3.40	2*n*	A
1901.63	145.5	3.32	2*n*	Doo

[β (**I, V**)... β (*Mon. Not.* **XXXIII**, 351; **XXXV**, 31)... Mh... Δ (**I**)... Δ (2081)... Kn ... Cin^3... Cin^4... Pt... T (2899, 2991)... Lv^1... Hl (**II**)... See (3496)... Doolittle (*Pub. Flower Obsy.* **I, II**) .... A (3585) .... Solá (3679) .... Scott (*Mon. Not.* **LXIV**, 52)...]

$20^m\ 33^s$ **10208.** **Σ 2682** *rej.* Only recently measured:

1904.46	302°1	20″30	2*n*	β^6	8.2...9.4

$21\ \ 5$ **10212.** **H 2963.** No description in H. Nothing here unless a faint pair (1875).

$21\ \ 10$ **10213.** **Δ 22.** Discovered by Dembowski in 1874. Probably fixed.

1886.50	138°4	2″74	3*n*	Ho
1905.48	143.4	2.90	1*n*	β

There is a 13.5 m star, 91°6 : 17″8.

[Δ (2086)... Δ (**I**)... Ho (2978)... β^6...]

$21\ \ 11$ **10214.** **A 291.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

$21\ \ 13$ **10215.** **Σ 2685.** Fixed.

1868.91	348°9	4″19	4*n*	Δ
1897.61	348.8	4.06	2*n*	Gla
1902.53	346.7	4.18	1*n*	Hu

[Ma (**XI**)... Ma (*F. S.* **I**)... Δ (**II**)... T (3185)... Glasenapp (**V**)...]

$21\ \ 14$ **10216.** **S 749.** (= **σ 674.**) The proper motion of both stars is given from meridian positions:

A = 0″183	in 244°1	Bossert
0.148	in 245.3	Porter
B = 0.161	in 248.2	Bossert
0.160	in 243.2	Porter

The measures show no relative motion.

1880.72	189°8	59″61	2*n*	β	7.1...7.4
1891.79	189.4	59.68	2*n*	Eng	
1901.69	189.7	59.81	3*n*	β	

[β^3... Engelhardt (**III**)... β^5...]

10218. **Σ 2694.** Probably fixed. $21^m\ 17^s$

1866.38	346°5	3″94	3*n*	Δ
1898.57	348.6	3.90	2*n*	Gla

[Ma (*F. S.* **I**)... Ma (**XI**)... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (**II**) ... Glasenapp (**V**)...]

10219. **Ho 129.** Unchanged. $21\ \ 20$

1895.21	144°8	4″62	2*n*	Ho
1904.69	149.5	4.60	3*n*	Doo

[Ho (2779, 3558)...]

10220. **Ho 130.** The later measures show increase in distance. $21\ \ 42$

1895.46	284°7	1″73	3*n*	Ho
1902.08	284.0	2.07	6*n*	Doo

[Ho (2779, 3558)...]

10221. **Σ 2683.** Without change. $21\ \ 44$

1866.99	67°2	22″78	3*n*	Δ
1902.62	66.4	23.00	3*n*	Hu

[Ma (*F. S.* **II**).... Mh.... Δ (**II**).... Cin^5.... Glasenapp (**I**).... *Annals Toulouse Obsy.* **III**...]

10222. **A. G. 255.** Double in *A. G. Lund.* Measures by β^6. $21\ \ 45$

10227. **H 916.** Measures from H (V). The later measures are: $21\ \ 50$

1879.46	257°2	18″00	1*n*	Cin^5	8.5...10.0
1905.48	256.5	17.04	2*n*	β^6	8.7...11.1

10228. *ρ Capricorni.* **Sh 323.** (= **H II. 51**; AC = **β 61**; AD = **Sh 322** = **H VI. 29.**) The faint star, C, was noted with the 6-inch. There are many measures of AB, which, taken together, do not show any sensible change. The principal star has a proper motion of 0″041 in the direction of 258°3 (Auwers). It would appear from the measures that A and B are moving together. The very distant star, D, is Lalande 39364. The Cordoba meridian observations give for AD, 149°9 : 245″8. $22\ \ 1$

A and B

1869.01	174°1	2″83	4*n*	Δ	5.0... 7.1
1872.28	172.4	2.92	2*n*	Sp	
1899.83	172.0	2.60	5*n*	Doo	5.0... 7.7

A and C

1898.63	151°3	55″16	3*n*	Doo	...12.3
1899.44	151.1	55.32	1*n*	β	...13.0
1901.63	150.9	55.22	2*n*	Doo	...12.7

A and D

1899.44	150°1	246″96	1*n*	β

[β (**I**).... β (*Mon. Not.* **XXXIII**, 351).... β (3114)(*Pub. L. O.* **II**).... Doolittle (*Pub. Flower Obsy.* **I, II**)... H (**VIII**)... Mh... J^2... J^3... Se... Se^3... Se (1017)... Kn... Pt... Δ (**I**)... Sp (**II**)... Cin^3... Cin^6... T (2899)... Lv^1... LM... Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 250)(*Mon. Not.* **LXIV**, 52)... Solá (3679).... Do (3799)...]

22^{m} 9^{s} **10231.** **A. G. 256.** Measures from *A. G. Leipzig*, p. 250. (See p. 1082)

22 10 **10232.** **A 292.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

22 23 **10234.** Double in *Cordoba Zones*, and both stars given in Cord. G. C. No. 10202 is identical with this pair.

[See (3496)...]

22 26 **10235.** **H 1516.** This star has a proper motion of 0″.031 in 270° (*A. G. Harvard*).

22 36 **10237.** **A 730.** With later measures (*Bul. L. O.* No. 61) the mean result is:

1904.52	313°.9	0″.21	3*n*	A	6.6...6.9

22 38 **10238.** **A 293.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

22 49 **10240.** **Ho 131.** The principal star is given a proper motion of 0″.384 in 109°.3 (*A. G. Berlin*). There is no change in the position of the companion.

1892.77	322°.9	4″.11	1*n*	Ho
1903.54	325.3	4.09	3*n*	β
1904.69	325.0	3.98	3*n*	Doo

For the verification of the proper motion hereafter, I have measured a distant 10.7 m star:

1903.54	81°.4	101″.02	3*n*	β

[Ho (2779, 3234)...β^{6}...]

22 49 **10241.** **Hn 38.** Probably fixed.

1888.33	294°.6	2″.56	3*n*	Com	8.4...10.3
1899.83	292.6	2.34	2*n*	A	9.0...11.2
1903.46	296.2	2.56	3*n*	Doo	8.7...11.7

[β^{4}...Com (VI)...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

23 ± **10244.** **H 3170.** "Uncertain correction on account of proximity to the pole." This reduced place given on the authority of Howe. Probably DM (89°) 37.

23 1 **10246.** *o Capricorni*. **Sh 324.** (= σ 677 = **H** **IV. 71.**) No sensible change. Porter gives the proper motion of the components from meridian observations:

A = 0″.081 in 187°.0
B = 0.098 in 186.7

1878.23	239°.4	22″.10	3*n*	Cin
1886.70	239.6	22.20	2*n*	Eng
1904.58	239.7	21.75	2*n*	β

[H^{3}...**Mh**...Se^{1}...Se^{2}...Ra (**XXI, XXIX**)...Ba (**II, III**)...Cin^{4}...Cin^{5} ..Cin^{6} ...Wilson (Cin^{10})... Scott (*Brit. Ast. Ass'n* **V**, 75)... Engelhardt (**II**) . Solá (3679)...β^{6}...]

10247. **β 62.** Discovered with the 6-inch. 23^{m} 6^{s}

1892.59	137°.6	1″.21	2*n*	Wilson
1898.54	136.2	1.16	3*n*	Doo

[β (I)... β (*Mon. Not.* **XXXIII**, 351)... Δ (I)... Wilson ( )... Doolittle (*Pub. Flower Obsy.* **I**)...]

10248. **Hn 159.** So far no change. 23 7

1903.46	284°.2	1″.08	3*n*	Doo	9.7...10.4

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10251. **A 731.** Later measures are given (*Bul. L. O.* No. 61). The mean is: 23 18

1904.50	214°.2	2″.24	3*n*	A	7.2...12.0

(See p. 1082)

10252. **H 1517.** Nothing but the following since H: 23 20

1880.74	103°.4	11″.89	1*n*	Big

(See p. 1083)

10254. **A 732.** With a later observation (*Bul. L. O.* No. 61) the mean is: 23 25

1904.45	77°.1	0″.67	3*n*	A	9.0...9.2

10256. **Σ 2687.** (= **H** **N. 89** = **S 753.**) Fixed. 23 29

1869.09	118°.3	26″.35	4*n*	Δ
1894.61	117.6	26.36	2*n*	Gla
1902.52	118.1	26.43	2*n*	Hu

[H (**IV**)...Ma (*F. S.* **II**)...Δ (**II**)...Glasenapp (**III**)....]

10257. **β 433.** Discovered with the 6-inch. The later measures are: 23 36

A and B

1898.47	206°.0	7″.81	3*n*	Doo	8.8...9.9

A and C

1898.47	244°.0	27″.57	3*n*	Doo	...9.2

[β (**VII**)...β (2103)... Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

10258. **Σ 2686.** Fixed. 23 58

1866.29	278°.8	26″.98	3*n*	Δ
1879.48	277.7	26.40	1*n*	Cin
1902.52	278.3	27.14	2*n*	Hu

[Ma (*F. S.* **II**)...Δ (1736)...Δ (**II**)...Pt...Cin^{5}...]

10261. **OΣ 526.** Fixed. 24 6

1870.85	170°.1	1″.40	4*n*	Δ
1898.55	168.7	1.42	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

10264. **β 363.** *Vulpeculae* 93. Discovered with the 6-inch. The principal star is W^{2} XX. 807. Change from proper motion. The following are all the measures: 24 28

A and B

1878.71	62°8	21″77	1*n*	β
1879.54	61.8	20±	1*n*	Cin
1892.68	65.4	19.72	2*n*	Wilson
1899.68	64.0	19.17	3*n*	Doo
1900.61	64.6	18.86	3*n*	β
1903.21	65.1	18.35	3*n*	β
1905.92	65.4	18.24	3*n*	β

A and C

1892.68	197°5	44″14	2*n*	Wilson
1900.62	198.7	44.40	2*n*	β
1903.21	199.1	44.55	3*n*	β
1905.92	198.8	45.07	3*n*	β

The measures of AB, treating the smaller star as fixed, give 0″140 in 51°7 for the proper motion of A.

[β (**VI**)...β (2062)...β^{1}...Cin^{5}...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...β^{5}...β^{6}...]

$24^{m}\,33^{s}$ **10266.** 1 *Delphini.* **β 63.** (AC = **β 297.**) The close pair was discovered with the 6-inch, and the distant star added with the Washington 26-inch. So far there appears to be no sensible change in AB. The proper motion of the principal star is very small, 0″0114 in the direction of 345°0. If this is substantially correct as to amount, the components are moving together, as otherwise the distance would be increased nearly 0″3 in the time covered by the measures. Some of the other observations are:

A and B

1878.60	338°9	0″85	1*n*	OΣ
1880.19	345.4	0.88	3*n*	β
1884.97	346.6	0.91	3*n*	HΣ
1887.60	344.8	0.89	3*n*	T
1887.84	347.4	0.79	2*n*	Hl
1888.59	347.0	0.89	3*n*	Lv
1888.62	347.9	0.67	8*n*	Sp
1891.69	353.0	1.06	2*n*	Maw
1897.82	346.5	1.11	2*n*	Brown
1898.48	343.6	0.93	2*n*	Doo
1898.64	346.7	0.88	2*n*	β
1898.70	344.0	1.14	4*n*	A
1898.85	353.9	0.93	1*n*	Maw

A and C (= β 297)

1885.60	349°0	16″71	1*n*	HΣ
1898.48	352.7	15.81	2*n*	Doo
1898.79	346.6	17.77	3*n*	A

[β (**I**)...β (*Mon. Not.* **XXXIII**)...β^{2}...β^{3}...Newcomb (*Wash. Obsns.* 1874)...Δ (**I**)...Δ (2081)...OΣ (**X**)...T (2899, 2991)...Lv^{1}...Hl (**II**)...Sp (**III**)...Maw (**I, III**)...Doolittle (*Pub. Flower Obsy.* **I**)...A (3585)...Brown (3646)...Do (3680)...Solá (3679)...HΣ (**XII**)...]

24 42 **10269.** **Weisse 35.** "Duplex" in W^{2}. Fixed.

AB	1902.61	212°1	3″81	2*n*	β	8.4...8.8
AC	1902.61	99.8	87.14	2*n*	β	
CD	1902.61	202.7	11.82	2*n*	β	8.9...9.5

[En (2678)...Cin^{5}...β^{6}...]

24 45 **10270.** **S 750.** Nothing but the following since 1825:

1879.39	322°7	67″86	1*n*	Cin^{5}	8.0...8.5
1904.30	322.6	67.11	2*n*	β^{6}	8.2...8.3

10271. **β 987.** (AC = **S 752** = σ 678.) The close companion to A was discovered with the 18½-inch. The proper motion of the principal star is 0″041 in the direction of 290°1 (*A. G. Berlin*). These are all the other measures: $24^{m}\,50^{s}$

A and B

1893.59	130°7	2″40	3*n*	Wilson
1899.71	127.3	2.50	3*n*	Doo
1903.30	126.0	2.56	2*n*	β

A and C (= S 752)

1879.99	288°5	106″17	2*n*	β
1903.30	288.3	105.97	3*n*	β

[β (**XIII**)...β^{3}...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...β^{6}...]

10274. **H 1523.** Probably unchanged. 25 9

1873.46	354°7	15″07	1*n*	Δ (I)	8.7...9.0
1904.77	349.4	14.07	2*n*	Espin	
1905.38	352.6	14.44	2*n*	β^{6}	8.8...9.2

[Espin (*Mon. Not.* **LXVI**, 142)...]

10275. **Σ 2688.** Distance larger? 25 10

1867.28	171°9	6″01	3*n*	Δ
1902.59	173.4	6.55	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^{1}...Se...Δ (**II**)...*A. G. Leipzig*, p. 211...]
(See p. 1083)

10276. **β 1135.** Discovered with the 12-inch. No motion. 25 10

1895.78	336°8	1″40	3*n*	A
1897.78	340.4	1.56	1*n*	A
1902.05	339.4	1.69	3*n*	Doo

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (*A. J.* 429)(*A. S. P.* **VII**, 305)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10277. **H 2973.** The only measures are: 25 12

1879.49	128°8	39″62	2*n*	Cin	8.0...8.5
1890.53	129.6	39.45	2*n*	Gla	7.7...8.0

[Cin^{5}...Glasenapp (**I**)...]

10278. **A. G. 257.** Double in *A. G. Albany*. Measures by Aitken. 25 13

1902.42	55°4	1″60	1*n*	Cg	8.5...8.5

[Cogshall (*A. J.* 554)...]

10279. **Σ 2691.** Fixed. 25 14

1867.96	32°3	17″09	4*n*	Δ
1894.69	31.9	17.22	2*n*	Gla
1902.65	32.4	17.22	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se^{1}...Ra (**XXIV**)...H (**IV**)...Δ (1209)...Δ (**I, II**)...Glasenapp (**III**)....*Annals Toulouse Obsy.* **III**....Espin (*Mon. Not.* **LXIV**, 677)...]

10280. **Σ 2693.** Fixed. 25 14

1865.54	13°5	13″65	3*n*	Δ
1905.76	12.7	13.68	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...Δ (**II**)...β^{6}...]

25ᵐ 28ˢ **10281.** **Da 1.** (= **OΣ** 407; AB = **Σ** 2690 = **H** III. 16 = **Sh** 325 = **S** 751 = **H** 269.) The duplicity of the Σ companion was discovered by Dawes in 1840, and subsequently appeared in the *Poulkowa Catalogue*. There has been no certain change since the first measures. The faint star D was added by H (IV). It is not in Σ, and the only other measures are those given here. The measures of A and BC show a slow increase in the distance.

A and BC (= Σ 2690)

1831.26	256°3	14″19	4*n*	Σ
1841.37	256.4	14.56	4*n*	Da
1846.95	256.6	14.71	4*n*	OΣ
1867.82	256.2	14.93	5*n*	Δ
1879.12	256.0	15.17	4*n*	Sp
1884.65	255.1	15.36	2*n*	Hl
1892.66	255.5	15.18	2*n*	Gla
1898.69	256.0	15.62	3*n*	Hu

B and C

1869.98	203°7	0″49	1*n*	Δ
1879.73	211.6	0.49	2*n*	Hl
1884.67	210.8	0.55	3*n*	Hl
1887.08	209.7	0.44	3*n*	HΣ
1898.69	214.2	0.48	3*n*	Hu
1903.73	213.8	0.50	3*n*	Biesbroeck

The change in the angle of the small star is doubtless due to the proper motion of A, but does not agree with the value given by meridian positions of 0″021 in 58°1 (Auwers).

A and D

1828	121°5	20″ ±	1*n*	H
1878.26	108.4	23.40	2*n*	β
1899.69	104.9	23.52	1*n*	Hu
1905.91	105.7	23.47	3*n*	β

[Da (*Mon. Not.* **V**, 61; **XXIV**, 117)... Da³ ... Bp ... Ma (324) ... Ma (*F. S.* **I**)... Ma (**IX, XI, XIII, XV**).... H (**IV**).... Bond (*Am. Acad. Sci.* **II**).... Se¹.... Se³.... Se (1017).... K.... Ra (**XXI**).... P¹.... Hd.... Ba (**II**).... OΣ (**IX**).... Δ (1194)... Δ (**I, II**)... Flm ... WS ... WS²... Gl ... Sk²... Pl... Perry (*Eng. Mech.* **XXXVI**, 65)... Giacomelli (**III**)... Newcomb (*Wash. Obsns.* 1874)... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)... Goldney (2257)... Je (2407)... Per... Per (2559)...β¹...β (*Mon. Not.* **XXXIV**, 379)... Ho (2978)... Lv¹... Sp (**II**)... En (2677)... Glasenapp (**I, II, III**)... Coleman (*Mem. R. A. S.* **LIII**)... Do (3681).... Solá (3679).... Hu (*Pub. L. O.* **V**).... *Annals Toulouse Obsy.* **III**.... HΣ (**XII**)... Biesbroeck...β⁶...]

25 31 **10282.** **H 1525.** Double in *A. G. Lund.*

1879.55 231°6 8″42 2*n* Cin⁵ 8.4...8.5

(See p. 1083)

25 32 **10283.** **See 420.** Later measures:

1899.66 85°1 1″61 2*n* Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

25 39 **10284.** **A 734.** The mean of the measures (*Bul. L. O.* No. 61) is:

1904.50 294°2 1″69 2*n* A 8.1...13.0

25 44 **10286.** **See —.** Discovered by See, but erroneously stated by him to be noted as double in Lalande and O. Arg. S.

1900.62 124°7 0″23 1*n* Hu 7.0...7.2

[See (3496)... Innes (*A. J.* 441)... Hu (*Bul. L. O.* No. 44)...]

10287. **A 170.** No other measures. 25ᵐ 44ˢ

[A (3741)(*Bul. L. O.* No. 3)...]

10289. **β 668.** Discovered with the 18½-inch. A very interesting physical system from the considerable proper motion of the components. This motion of the principal star is given: 25 49

Bonn	0″309 in 67°7
Auwers	0.309 in 72.1
Porter	0.305 in 66.2
Paris	0.234 in 61.4

There has been very little, if any, change in the position of the small star in twenty years. The following are all the later measures:

1881.67	26°1	4″99	4*n*	β
1890.57	25.0	4.80	3*n*	β
1891.49	27.8	4.64	3*n*	β
1898.56	27.3	4.75	2*n*	β
1898.57	25.6	4.96	3*n*	A
1898.70	26.3	4.66	4*n*	Doo

[β (**X**)... β¹... β⁴... β (3048, 3114) (*Pub. L. O.* **II**)... A (3585)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10290. **Σ 2692.** (= **S** 754.) Fixed. 25 56

1867.35	301°7	25″73	4*n*	Δ
1903.54	301.9	25.71	3*n*	β

There is a nearer star, 12.5 m, not observed by Struve:

1879.39	157°0	10″ ±	1*n*	Cin
1903.55	158.2	10.11	2*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)... Cin⁵... β⁶...]

10291. **A 733.** With other measures (*Bul. L. O.* No. 61) the mean is: 25 57

1904.50 165°9 1″21 3*n* A 8.0...9.7

(See p. 1083)

10292. **Hu 760.** (AB = **H** 1526.) The duplicity of the small star was discovered by Hussey. The only measures of the wide pair are: 26 2

1904.46	149°7	8″78	1*n*	Hu
1904.74	149.6	8.72	3*n*	Espin

[Hu (*Bul. L. O.* No. 65)... Espin (*Mon. Not.* **LXVI**, 142)...]

10294. **Ho 132.** No change. 26 6

1905.60 207°0 6″80 3*n* Doo

[Ho (2779, 3558)...]

10295. **Ho 133.** (= **Hn** 160.) Without change. 26 10

1888.72	180°9	1″15	3*n*	Com
1905.64	179.2	0.94	3*n*	Doo

[Ho (2779, 3558)... LM... *Pub. Washburn Obsy.* **II**... Com (**VI**)...]

10296. **A 735.** With a later measure (*Bul. L. O.* No. 61): 26 12

1904.50 271°6 4″36 2*n* A 9.0...10.8

26m 17s **10297.** **Hn 161.** Recent measures show no change:

1905.81	51°0	2″00	2*n*	Doo	8.8...10.7

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

26 20 **10298.** ω^2 *Cygni.* **β 669.** These distant companions were noted with the 18½-inch. Auwers gives the proper motion 0″042 in the direction of 160°8. This would increase the distance of B in twenty years about 0″8, and this change is shown by the measures.

A and B

1898.51	342°2	18″11	3*n*	β

A and C

1893.65	86°6	55″86	4*n*	W
1898.49	86.5	56.02	2*n*	Doo
1898.51	86.3	56.39	3*n*	β

[β (**X**)...β1...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...]

26 26 **10301.** 44 *Cygni.* **A. Clark 18.** Discovered by Alvan Clark in 1859 with the 8¼-inch at the observatory of Dawes. Apparently without change. The proper motion is small, 0″005 in 31°1 (Auwers).

1864.79	157°9	2″26	9*n*	Δ	...11.0
1888.62	160.1	2.33	5*n*	HΣ	
1900.55	157.2	2.13	2*n*	A	...11.8

[Da4...Da (*Mon. Not.* **XVII**, 257)...Wn (1738)...Δ (1574)...Δ (**I**)...OΣ (**X**)...WS...WS2...Ho (2978)...HΣ (**XII**)...A (*Bul. L. O.* No. 11)...]

26 30 **10302.** **H 2975.** "Difficult." These stars appear to have a common proper motion of 0″128 in 180° (Paris).

1877.75	20°0	9″78	1*n*	Cin	7.5...11.2
1882.64	23.0	10 ±	1*n*	W	7.0...10.0
1897.62	21.2	9.44	2*n*	See	7.0...11.8
1905.49	23.6	10.22	1*n*	β	8.0...13

[Cin4...Wilson (Cin10)...See (3496)...β6...]

26 31 **10303.** **♅ N. 7.** "Very close triple. Vertex *f*," and given as Class I–II. There is a small triple in or very near Herschel's place, and this is probably the star referred to:

AB	1901.61	340°7	14″84	1*n*	β5	10.0...10.5
AC	1901.61	226.7	20.04	1*n*	β5	...10.3

There is a 13m star, 150°0 : 15″3 from A.

26 50 **10305.** **Σ 2695.** *Vulpeculae* 94. Very little change. Later measures make the distance a little larger than Σ.

1869.19	77°4	1″09	5*n*	Δ
1879.89	81.1	1.00	1*n*	β
1883.62	78.1	1.16	4*n*	Per
1897.74	75.7	1.21	3*n*	Doo
1902.14	74.6	0.89	2*n*	A
1903.72	80.6	1.21	4*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**IX, X**)...Da3...Se...Se3...Se (*Comp. Rend.* **XLVIII**, 375)...Δ (1125)...Δ (**I, II**)...Sk2...OΣ (**IX, X**)...β3...Sp (**II**)...UL...Per...Per (2559)...Big...En (2677)...T (2991)...Glasenapp (**III**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 804; **LXVI**, 30)...Do (3466, 3680)...Doolittle (*Pub. Flower Obsy.* **I**)...Maw (**III**)...Coleman (*Mem. R. A. S.* **LIV**)...Lohse (*Pub. Potsdam Obsy.*)...]

10307. **Lewis 35.** The place given by Lewis is the same as that of β 670. 27m ·

1902.14	138°0	0″44	4*n*	Lewis

[Lewis (*Mon. Not.* **LXI**, 486; **LXII**, 397; **LXIII**, 414)...]

10308. **H 1529.** "A *red*." Color not striking with 6-inch (1875), and only reddish with the 40-inch (1905). 27 0

1905.49	108°8	36″15	1*n*	β6	7.8....10.0

10309. **S 755.** (= **♅ IV. 23** = σ 683.) Probably fixed. B is DM (48°) 3146. 27 11

1878.76	278°5	60″54	1*n*	Doubiago	6.6...8.8
1898.49	278.5	60.10	1*n*	Gla	6.5...9.0
1904.46	278.6	60.15	2*n*	β	6.6...9.0

[OΣ (**X**)...Glasenapp (**V**)...β6...]

10310. **β 670.** Discovered with the 18½-inch. Some change in angle and distance. These are all the measures: 27 17

1877.75	58°3	0″76	2*n*	β
1877.83	53.5	0.63	1*n*	Δ
1889.87	50.7	0.6 ±	5*n*	Sp
1893.51	47.3	0.53	3*n*	Lv
1896.12	44.8	0.62	2*n*	Wilson
1897.84	48.4	0.45	2*n*	Brown
1898.75	47.1	0.57	3*n*	A
1901.95	37.9	0.73	6*n*	Lewis
1903.19	47.5	0.59	6*n*	Doo
1904.70	41.9	0.50	2*n*	Bowyer

[β (**X**)....β1....Δ (**I**)....Sp (**III**)....Lv (*A. J.* 382)....A (3585)....Brown (3646)....Greenwich Obsy. (*Mon. Not.* **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXVI**, 30)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

10314. **Σ 2696.** Probably without change. 27 34

1868.54	303°7	0″97	2*n*	Δ
1880.61	306.6	0.98	1*n*	β
1881.68	301.5	0.79	6*n*	Hl
1901.75	306.5	0.77	2*n*	β

There is a 14m star, first noted with the 18½-inch. The only measure is:

AB and C

1901.75	348°7	13″78	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H (**IV**)...Se...Ferr...Hd..OΣ (**IX**)...Δ (**II**)...WS...WS2...Gl...Sk2...Flm...Lv1...β3...En (2786)...T (2991)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...Glasenapp (**III**)...β5...]

10315. ω^3 *Cygni.* **S 756.** (= σ 684 = **H 1534** = **♅ IV.** 24?) South says this is "not ♅ IV. 24." The angle in ♅'s original catalogue is 44°3 *np* (= 314°3), and estimated distance 30″, so they probably refer to this pair. The proper motion of the larger star is 0″042 in 160°9 (Auwers). There are other stars in the field nearer than B. 27 36

1840.84	319°8	55″34	1*n*	OΣ	5.0...9.5
1898.49	322.5	57.11	1*n*	Gla	...9.5
1903.21	322.6	56.84	3*n*	β	...9.7

[OΣ (**X**)...Bl (**V**)...Glasenapp (**V**)...β6...]

$28^m\ 5^s$ **10318.** **β 434.** Discovered with the 6-inch.

1892.70	100°8	1″56	2*n*	W	9.0...9.8
1902.99	101.4	1.49	3*n*	Doo	8.9...9.2

[β (**VII**)...β (2103)...Δ (I)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **II**)...]

28 6 **10319.** **β 1136.** Discovered with the 12-inch. The following are all the other measures:

1899.76	215°5	0″19	1*n*	Barnard
1899.82	200.9	0.39	1*n*	A
1903.74	209.3	0.30	2*n*	Doo
1904.05	201.8	0.36	1*n*	Biesbroeck

[β (**XVI**)...β (2956) (*Pub. L. O.* **II**)...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

28 13 **10320.** **Σ 2697** *rej.* The following are all the observations since Struve:

1848.67	1°7	32″10	1*n*	Mh	
1901.74	1.8	30.42	2*n*	β	7.5...9.5

[Mh...β^5...]

28 15 **10321.** **Ma 8.** From list of new pairs in Ma (XI).

1878.26	248°4	18″14	2*n*	β^1	8.5...11.0
1902.43	247.3	19.54	2*n*	β^6	8.5...11.0

28 27 **10323.** **H 1540.** "A third star 25″, 13m." The magnitude is 8.5 in DM. Nothing since H but the following:

AB	1905.84	345°4	22″62	3*n*	Doo	8.6...11.7
AC	1905.84	130.9	41.79	3*n*	Doo	...12.4

28 30 **10324.** **Hu 761.** With a later measure (*Bul. L. O.* No. 65) the mean is:

1904.49	114°9	0″46	2*n*	Hu

28 32 **10325.** **H 1535.** The only observations since H are:

AB	1902.56	247°4	16″95	2*n*	β^6	8.0...11.6
AC	1902.56	150.3	18.38	2*n*	β^6	...11.6

The angles are different in H, and the change is probably due to the proper motion of A, 0″168 in 47°5 (Bakhuyzen).

[Espin (*Mon. Not.* **LXVI**, 142)...]

28 38 **10326.** **β 1208.** Discovered with 36-inch. The later measures are:

1897.80	333°0	3″12	1*n*	Brown
1899.45	330.8	3.02	2*n*	A
1903.69	330.5	2.90	2*n*	A

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...Brown (3646)...A (3639)...]

28 43 **10327.** **Σ 2698.** (= **S** 757.) Increase in distance is probable.

1867.34	304°2	4″25	4*n*	Δ
1883.61	303.5	4.49	3*n*	Per
1902.65	303.0	4.72	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Bp...Da^1...Da^3...Se...Ba (**II**)...Du...Per ...Per (2559)...Δ (**II**)...Lewis (*Mon. Not.* **LXIV**, 804)...]

$28^m\ 43^s$ **10328.** **A 737.** With the measure given and two later measures (*Bul. L. O.* No. 61) the mean is:

1904.50	64°3	1″46	3*n*	A	8.0...11.0

28 49 **10330.** **Schj. 26.** From list of new pairs in Schjellerup's *Catalogue of Stars*, but given there with error in declination, making it 1° *n* of the correct place given in Part I (see No. 10335). The only measures are:

1903.88	87°1	24″17	3*n*	β	8.5...9.3

This is DM (4°) 4490.

[β^6...β (3912, 3920)...Thiele (3920)...]

28 56 **10331.** **H 1539.** "A fourth more distant *sf.*" The principal star is 8.5 in DM. The only measures are:

AB	1904.53	204°3	9″48	2*n*	β^6	9.0...10.2
AC	1904.53	51.4	18.27	2*n*	β^6	...11.6

29 6 **10334.** **♅ N. 134.** In H's general catalogue of his father's stars, this is given as Class I, but in the original list of ♅ (*Mem. R. A. S.* I) it is described as "2d or 3d class, considerably unequal." There is no doubt of its identity with Σ 2699.

29 14 **10335.** This wide pair was measured by Howe (Cin^5) in 1879 for Schj. 26 (No. 10330), there being an error of 1° declination in the place given by Schjellerup for that star. In remeasuring this in 1903 a very decided change in angle and distance was found:

1903.58	53°9	58″82	4*n*	β^6	8.6...10.5

A comparison of the meridian positions of this star with DM (5°) 4557 and 4563, and their present relation showed that 4556 had a proper motion of 0″505 in 135°3, and this was confirmed by the change in the companion from the micrometrical measures (*A. N.* 3912, 3920). (See p. 1083)

29 19 **10338.** **OΣ 408.** No evidence of motion.

1869.78	192°6	1″58	6*n*	Δ
1898.60	193.3	1.64	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Ho (3558)...Hu (*Pub. L. O.* **V**)...]

29 32 **10339.** **H 5513.** "Curiously quadruple; four small stars alternately 15 and 16m, and very close. In a line nearly." This vicinity was swept over with the 40-inch in 1903, but nothing found which could be identified with certainty as H 5513.

29 33 **10340.** **β 671.** Discovered with the 18½-inch. No certain change. The following are all the other measures:

1877.57	334°8	0″5±	1*n*	β	8.0...10.0
1879.49	333.9	0.42	1*n*	β	7.5... 9.0
1881.57	333.2	0.49	1*n*	β	8.0...11.5
1885.53	337.9	0.6±	1*n*	HΣ	
1898.65	336.0	0.49	2*n*	Doo	7.9... 8.7

[β (**X**)...β^1...β^3...β^4...Δ (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

29m 33s **10341.** **H 609.** The only measures are:

1904.71	327°.1	25″.73	2*n*	Espin	8.7...8.9

[Espin (*Mon. Not.* **LXVI**, 142)...]

29 34 **10342.** **H 1537.** I noted, 1876, "stars equal, 8m." In O. Arg. S. 8m. Apparently fixed.

1879.47	21°.0	3″.43	1*n*	Cin	8.0...9.0
1902.00	21.9	3.32	6*n*	Doo	8.2...8.6

[Cin^5....Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)....Doolittle (*Pub. Flower Obsy.* **I, II**)...]

29 39 **10343.** **A 738.** (AC = **H 1541.**) Since Part I was printed, Aitken has discovered a closer companion:

AB	1904.55	250°.8	2″.34	2*n*	A	8.7...10.5
AC	1904.55	266.2	6.28	2*n*	A	... 9.7

There is no other measure of the H companion.

[A (*Bul. L. O.* No. 61)...]

29 55 **10344.** **Σ 2700.** Fixed.

1866.13	285°.3	23″.74	3*n*	Δ
1892.66	285.1	23.73	4*n*	Gla
1903.68	285.2	24.07	2*n*	Hu

[Ma (*F. S.* **II**)... Δ (**II**)... Cin^5... Glasenapp (**III, IV**)...*Annals Toulouse Obsy.* **III**...]

30 **10345.** **O. Stone 51.** From Cin^5. This should be very near Σ 2700. In measuring H 1535 (No. 10335) it was looked for but not found.

30 2 **10346.** **Ho 279.** The measures are discordant in distance. The later positions are:

1895.77	173°.3	8″.44	2*n*	Ho
1902.67	173.0	7.77	4*n*	Doo

[Ho (2977, 3558)...]

(See p. 1083)

30 6 **10348.** **Weisse 36.** "Duplex" in W^1. A recent examination shows there is nothing in this place in the DM or in the sky. There is no doubt the declination should be −13° instead of −3°, making it really identical with Σ 2699.

30 15 **10350.** **H 1543.** No motion.

1873.49	26°.2	16″.35	1*n*	Δ	9.0...9.2
1902.56	26.2	16.42	2*n*	β	9.0...9.2

[Δ (**I**)... Big...β^6...]

30 17 **10352.** **Σ 2699.** (= **𝕳 N. 134 = H 270 = S 758.**) C and D from H (I). By single settings these positions are: AC 169°.9 : 38″.7; AD 157°.7 : 59″.9 (1904.61). Hd 157, given without description in Hd, "near Σ 2699," is probably CD.

There is no change in the Struve stars:

1866.99	195°.8	9″.60	3*n*	Δ
1892.78	194.2	9.56	3*n*	T
1904.61	195.1	9.51	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XIII**)... H (**I, VII**)... Mh...WS^2... Cin^5... T (3185)... Glasenapp (**I**)... Solá (3679)...β^6...]

10355. **A. G. 258.** Measures from *A. G. Leipzig*, p. 250. 30m 51s

(See p. 1083)

10356. **OΣ (App) 208.** The larger star has a proper motion of 0″.090 in 69°.3 (*Gr. 10-Year Catalogue*). 30 54

1886.96	241°.0	76″.79	4*n*	Franz
1905.37	241.3	77.80	3*n*	β

The three sets of measures give for the proper motion, 0″.048 in 69°.0.

[Δ (**I**)... Franz (3080)...β^6...]

10357. **Σ 2702.** (= **Ho 134.**) Fixed. 30 54

1868.50	204°.4	3″.19	4*n*	Δ
1882.69	202.0	3.06	2*n*	Ho
1905.55	204.3	3.14	3*n*	Doo

[Ma (*F. S.* **I**)... Ma (**XI**)... H^1... Se... Ferr... Δ (**II**)... Ho (2779)... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**... Furner (*Mon. Not.* **LXVI**, 30)...]

10358. **O. Stone 52.** The other measures are: 31 2

1882.63	245°.4	1″.78	2*n*	W	9.0...9.3
1886.78	245.9	1.71	1*n*	LM	8.4...8.4

[Cin^6... Wilson (Cin^{10})...LM...]

10361. **Σ 2703.** (= **𝕳 IV. 92 = S 759.**) No change in AB, but the distance of C is increasing, and that star, from the measures, has an annual proper motion of 0″.068 in the direction of 202°.1. 31 13

A and B

1829.52	291°.2	25″.09	4*n*	Σ
1864.60	290.9	25.13	4*n*	Δ
1868.53	290.5	25.15	4*n*	Du
1885.19	290.3	25.36	12*n*	Hl
1905.35	290.3	25.09	1*n*	β

A and C

1829.40	239°.4	66″.72	3*n*	Σ
1864.60	238.3	68.62	4*n*	Δ
1879.69	237.6	69.70	6*n*	Hl
1890.69	237.1	70.20	5*n*	Hl
1905.34	236.8	70.72	2*n*	β

B and C

1829.42	217°.9	54″.38	3*n*	Σ
1864.60	217.2	56.98	4*n*	Δ
1879.69	217.0	58.02	6*n*	Hl
1890.69	216.8	58.89	5*n*	Hl
1905.34	216.7	59.48	2*n*	β

[Ma (*F. S.* **II**)... Ma (**IX, X**)...Se^1...Ra (**XXV**)... Nobile (*Rend. della Accad. Sci.* Napoli, Dec. 1877)...Giacomelli (**III**)... Flm... Δ (1194, 1573)... Δ (**I, II**)...Je (2407)... Du...β^1... Hl (**I**, p. 30; **II**)... Glasenapp (**III**)... Do (3681)...*Annals Toulouse Obsy.* **III**...β^6...]

$31^m 15^s$ **10362.** Σ 2701. Probably fixed.

1866.69	222°.2	2″.15	3*n*	Δ
1888.72	219.3	2.13	2*n*	T
1894.57	223.4	2.26	2*n*	Gla
1905.58	223.4	1.98	1*n*	β

[Ma (*F. S.* I)....Ma (**XI**)....H[1]....Bp....Da[3]....Se....Ra (**XXIV**)....Ba (**II**).... Δ (1125)... Δ (**II**)... T (2991)... Glasenapp (**I, III**)... *Annals Toulouse Obsy.* **III**...β[6]...]

31 55 **10363.** **β** *Delphini.* **β** 151. (AD = H IV. 35 = Σ 2704.) The close pair, AB, was discovered with the 6-inch in August 1873. It was evident at this time that it would prove to be a binary system, as otherwise it could not have escaped detection by prior observers. It has now completed more than one revolution since it was discovered. The following orbits have been computed, the first column giving the date of the last measures used:

1883	Doubiago	26.07 yrs.	*A. N.* 2602
1884	Gore	30.91	*Proc. R. I. Acad.* IV, No. 5
1887	Celoria	16.95	*A. N.* 2824
1890	Burnham	28.5	*Sid. Mess.* X, 215
1892	Glasenapp	22.97	*A. N.* 3177
1895	See	27.66	*Evolution of the Stellar Systems*
1899	Burnham	26.70	*Pub. Y. O.* I
1901	Aitken	27.66	*Bul. L. O.* No. 26
1904	Lohse	27.20	(Unpublished)

The elements of the orbits are as follows:

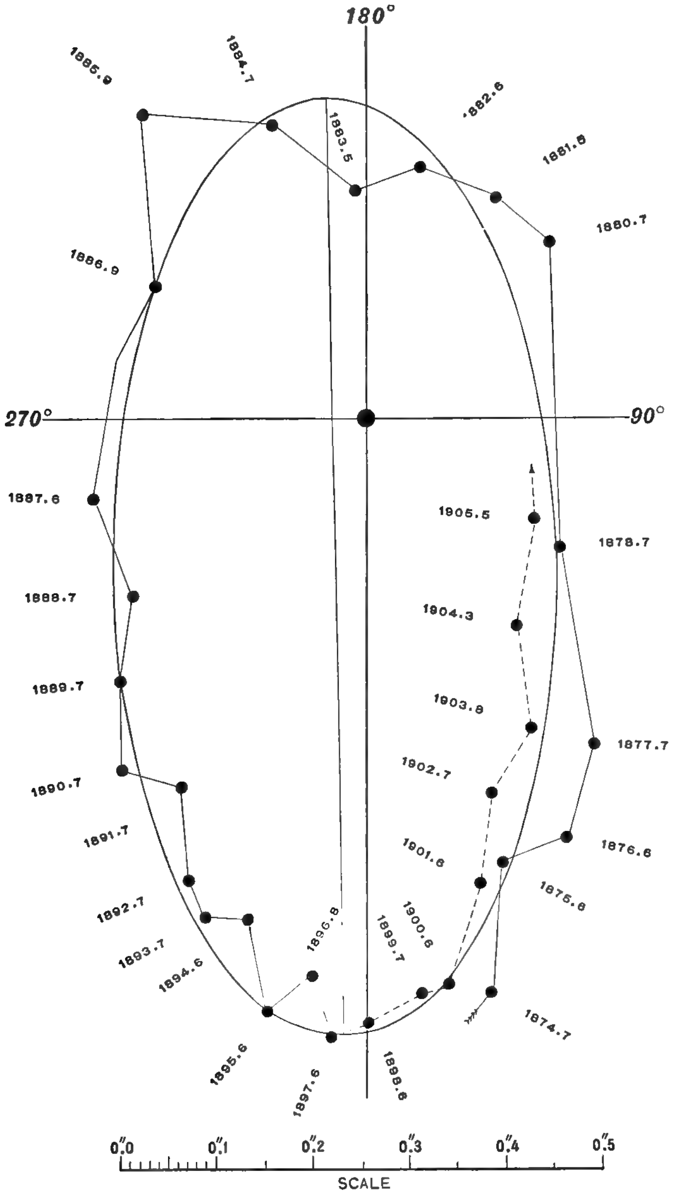
		P	*T*	*e*	*a*	Ω	*i*	λ
1883	Doubiago..	26.07	1882.2	0.36	0″.55	163°.6	54°.9	354°.6
1884	Gore......	30.91	1882.2	0.34	0.52	2.7	59.3	327.8
1887	Celoria ...	16.95	1885.8	0.09	0.46	10.9	61.6	220.9
1892	Glasenapp .	22.97	1882.4	0.26	0.50	174.2	64.1	343.9
1895	See.......	27.66	1883.0	0.37	0.67	3.9	61.3	164.9
1899	Burnham ..	26.70	1883.1	0.33	0.48	1.8	55.9	171.7
1901	Aitken	27.66	1883.1	0.36	0.48	178.9	60.9	351.9

The following is a complete list of the measures of the close pair:

A and B

1873.60	355°±	0″.7±		β
1874.66	15.5	0.65	5*n*	Δ
1874.70	13.6	0.49	3*n*	Newcomb
1874.73	8.0	0.69	1*n*	OΣ
1875.61	14.7	0.42	4*n*	Sp
1875.65	20.1	0.54	4*n*	Δ
1876.65	25.8	0.48	4*n*	Δ
1876.85	54.4	Obl.	1*n*	OΣ
1877.27	17.7	0.35	2*n*	Sp
1877.71	29.7	0.51	5*n*	Δ
1877.79	40.8	0.32	2*n*	β
1878.65	53.7	0.24	4*n*	β
1878.75	59.2	....	1*n*	Δ
1880.68	133.6	0.26	3*n*	β
1880.75	214.5	0.2±	2*n*	Hl
1881.54	149.2	0.26	5*n*	β
1881.88	154.7	....	1*n*	Big
1882.60	167.5	0.26	3*n*	β
1883.25	183.9	0.19	7*n*	En
1883.55	182.5	0.23	3*n*	β
1883.69	185.4	0.30	2*n*	Young
1884.68	198°.1	0″.33	3*n*	Young
1884.69	195.9	0.32	3*n*	Hl
1884.71	197.7	0.32	4*n*	En
1884.77	199.2	0.29	5*n*	β
1885.59	207.6	0.22	1*n*	Young
1885.61	222.9	0.4±	1*n*	HΣ
1885.75	Single		2*n*	Hl
1885.91	216.6	0.38	8*n*	En
1886.77	251.5	0.2±	1*n*	Young
1886.77	257.8	....	1*n*	HΣ
1886.88	238.1	0.25±	7*n*	Sp
1886.91	219.5	0.39	4*n*	En
1887.55	278.5	0.36	5*n*	T
1887.66	272.0	0.41	5*n*	HΣ
1887.75	308.1	0.3±	1*n*	Ho
1887.85	287.8	0.2±	8*n*	Sp
1888.65	310.1	0.29	7*n*	β
1888.81	300.9	0.35	3*n*	HΣ
1888.83	311.5	0.25±	17*n*	Sp
1889.50	314.2	0.31	5*n*	β
1889.78	318.5	0.43	6*n*	HΣ
1889.36	319.2	0.37±	11*n*	Sp
1890.49	324.2	0.45	4*n*	β
1890.89	326.5	0.43	12*n*	Sp
1891.45	331.6	0.38	4*n*	β
1891.52	338.4	0.79	1*n*	See
1891.64	330.1	0.39	3*n*	Hl
1891.76	334.0	0.47	5*n*	HΣ
1891.84	338.2	....	1*n*	Big
1891.88	333.5	0.46	9*n*	Sp
1892.39	338.7	0.50	4*n*	β
1892.76	330.4	0.4	3*n*	Gl
1892.87	337.6	0.49	2*n*	Barnard
1892.92	340.7	0.54	5*n*	Sp
1893.52	339.2	0.58	2*n*	Lv
1893.53	338.8	0.73	2*n*	Wilson
1893.63	335.3	0.57	3*n*	Ho
1893.70	342.2	0.56	5*n*	Barnard
1893.70	341.5	0.5	15*n*	Gl
1893.79	346.8	0.51	3*n*	Com
1893.87	344.3	0.51	13*n*	Sp
1893.95	345.8	...	1*n*	Big
1894.51	346.3	0.56	8*n*	Barnard
1894.72	345.9	0.6±	1*n*	HΣ
1894.83	347.2	0.50	13*n*	Sp
1895.31	351.8	0.49	1*n*	See
1895.48	349.7	0.68	6*n*	Barnard
1895.61	348.1	0.54	1*n*	Ho
1895.66	350.8	0.58	3*n*	Com
1895.69	350.3	0.66	2*n*	Dyson
1895.81	351.9	0.65	1*n*	Lewis
1895.87	351.9	0.67	3*n*	Sp
1896.63	361.8	0.45	1*n*	Pt
1896.66	354.0	0.59	3*n*	Com
1896.69	356.6	0.51	3*n*	Morgan
1896.76	357.0	0.67	3*n*	See
1896.84	352.6	0.49	3*n*	A
1896.86	355.1	0.60	3*n*	Hu
1896.86	355.3	0.7	7*n*	Gl
1896.87	355.9	0.65	7*n*	Sp
1897.52	357.6	0.84	2*n*	Lehman
1897.55	356.7	0.55	4*n*	Barnard
1897.55	356.3	0.68	3*n*	A
1897.61	357.3	0.71	4*n*	Hu
1897.65	362.5	0.55	1*n*	Maw

1897.65	359°.6	0″.7	5*n*	Gl
1897.66	356.1	0.79	3*n*	Doo
1897.69	357.7	0.62	4*n*	Do
1897.76	354.0	0.65	1*n*	See
1897.86	356.9	0.62	4*n*	Sp
1897.90	359.5	0.63	1*n*	Brown
1898.50	361.0	0.64	3*n*	A



β Delphini. β 151.

1898.58	359°.0	0″.67	4*n*	β
1898.61	360.3	0.62	7*n*	Hu
1898.70	359.5	0.79	4*n*	Doo
1898.71	362.4	0.8	20*n*	Gl
1898.72	363.0	0.55	2*n*	Brown
1898.75	364.7	0.66	1*n*	Lewis
1898.90	360.4	0.57	5*n*	Sp

1899.62	6°.8	0″.43	2*n*	Bryant
1899.64	4.6	0.60	3*n*	Doo
1899.68	6.4	0.41	4*n*	Bowyer
1899.72	5.6	0.56	3*n*	Lewis
1899.76	7.9	0.68	2*n*	See
1899.76	5.5	0.58	3*n*	Brown
1899.76	3.7	0.59	3*n*	A
1900.49	9.9	0.68	4*n*	Lohse
1900.61	9.0	0.64	1*n*	Bryant
1900.64	7.6	0.54	3*n*	A
1900.64	8.0	0.52	2*n*	Do
1900.65	8.0	0.7	23*n*	Gl
1900.66	357.4	0.55±	1*n*	Solá
1900.67	9.8	0.63	1*n*	Lewis
1900.82	13.5	0.63	2*n*	Doo
1901.51	10.6	0.47	3*n*	A
1901.63	14.0	0.54	3*n*	Lewis
1901.64	14.6	0.39	2*n*	Bowyer
1901.68	16.8	0.45	8*n*	Bryant
1901.71	17.6	....	1*n*	Lohse
1901.80	14.6	0.63	3*n*	Doo
1902.68	19.8	0.40	1*n*	Lewis
1902.73	19.1	0.31	1*n*	Bowyer
1902.74	20.1	0.40	4*n*	Bryant
1902.78	15.9	0.51	5*n*	Doo
1903.65	25.1	0.44	7*n*	Biesbroeck
1903.79	25.8	0.5±	10*n*	Lohse
1903.82	32.0	0.36	3*n*	Bryant
1903.82	30.2	0.28	2*n*	Bowyer
1904.35	36.2	0.26	4*n*	A
1904.65	35.3	....	7*n*	Lohse
1904.70	38.9	0.24	4*n*	Bowyer
1904.82	34.3	0.35	1*n*	Furner
1904.87	47.5	0.29	1*n*	Lewis
1905.51	59.5	0.20	4*n*	A

The principal measures in yearly means are shown on the diagram. The true period will not be far from 27 years.

The next companion, C, was discovered by Herschel, and is first mentioned in his *Fourth Catalogue* (*Mem. R. A. S.* IV). This is much fainter than the more distant companion discovered by the first Herschel, and observed by Struve as Σ 2704, and does not appear to have been noticed by either of these observers. On account of its faintness it has been missed or neglected by all the early observers who measured D.

There is no lack of positions of D, as this is readily seen with the smallest apertures. The change is due to the proper motion of the principal star. Auwers gives this as 0″.093 in the direction of 110°.1. As this movement is nearly in the direction of C, it will finally become a difficult object, the minimum distance of 3¼″ being reached in about 275 years.

AB and C (= Herschel)

1828	107°.7	18″±	1*n*	H
1878.05	116.2	27.66	3*n*	β
1881.19	115.6	27.57	4*n*	β
1889.80	116.7	26.84	5*n*	β
1898.49	117.6	25.87	3*n*	β
1902.78	119.6	25.20	2*n*	Lewis

AB and D (= H IV. 35 = Σ 2704)

1829.40	343°.8	32″.48	3*n*	Σ
1851.84	339.2	33.74	2*n*	OΣ
1864.94	336.6	34.64	3*n*	Δ
1888.82	333.2	36.35	2*n*	β
1898.49	331.4	37.18	3*n*	β
1902.79	330.5	37.50	2*n*	Doo
1905.93	330.5	37.51	3*n*	β

These positions of the distant companions give an independent and better value of the proper motion of AB. That from the measures of D, covering a period of three-fourths of a century, should be practically correct.

Measures of D	0″.126	in	99°.5
Measures of C	0.117	in	94.1

In 1896 See measured a faint star from AB 111°.2 : 5″.66 (1896.75) 5*n*, with the 24-inch of the Lowell Observatory. As this star has not been seen elsewhere with much larger apertures, there is no doubt of its being an illusion.

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β1...β3...β (*Am. Jour. Sci.* Sept. 1873) (*Mon. Not.* **LXI**, 305)(*Sid. Mess.* **X**, 215)...β (2875, 2957, 3048, 3114, 3142)... β (*A. J.* 246)....Δ (**II**, p. 491)....Δ (1573, 2086, 2195)....Newcomb (*Wash. Obsns.* 1874)...OΣ (**IX**, 222; **X**. 47, 185)...Sp (**II**, **II** App., **III**)...Sp (2133)... Hl (**II**)(*A. J.* 247)...En (2678, 2742, 2786)...T (2899)...Big...Big (*Bul. Ast.* **XII**, 299)...Barnard (*A. J.* 447)...Lv (*A. J.* 382)...Com (**X**)...Pritchett (*A. J.* 397)...Do (3466, 3680)...Brown (3646)...Gl (*Mon. Not.* **LXI**, 556)...Morgan (*A. J.* 439)...Lehman (*Pub.* **A**. *S. P.* **IX**, 141)...HΣ (**XII**)...Solá (3679)... Ho (2978, 3234, 3558)...Maw (**III**)...See (3314, 3496)(**A**. *J.* 349, 357, 378)(*Beob. Sternwarte*, No. 6, Berlin 1892)(*Evolution of the Stellar Systems*)....Hadley (*Pop. Ast.* **XIII**, 264)...Hu (*A. J.* 397, 427)(*Bul. L. O.* No. 44)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXI**, 486; **LXII**, 383; **LXIV**, 804; **LXVI**, 30)...Biesbroeck...Doolittle (*A. J.* 416, 547)(*Pub. Flower Obsy.* **I**, **II**)...Lohse (*Pub. Potsdam Obsy.*)...A (3466, 3585, 3639)(*A. J.* 429)(*Bul. L. O.* No. 11)(*Bul. L. O.* No. 26)(*Pop. Ast.* **X**, 486; **XI**, 28)(*Pub. A. S. P.* **XIV**, 153)...] (See p. 1083)

A few only of the measures of D are given. They will all be found in the references cited for AB, and in the following:

[Ma (*F. S.* **I**)...Ma (**XI**, **XIII**, **XV**)...Mu...WS2...Sk...H (**IV**)...Gore (*Ast. Reg.* **XIX**, 144)...Everett (*Mon. Not.* **LVI**, 464)...Flm...]

32^{m} 5^{s} **10366.** **H 1551.** "P est. from diagram." The only measure is:

1905.66	228°.0	26″.08	1*n*	β6	9.0...10.0

32 8 **10367.** 71 *Aquilae.* **β 672.** Discovered with the 18½-inch. This star has no sensible proper motion, 0″.005 in 257°.5 (*A. G. Nico.*). Found to be a spectrotcopic binary by Curtis at Mt. Hamilton.

1892.83	280°.9	30″.68	2*n*	Ho
1898.62	281.1	31.54	3*n*	Cogshall

[β (**X**)...β1...Ho (3234)...Cogshall (*A. J.* 478)...Curtis (*Bul. L. O.* No. 70)...] (See p. 1083)

32 10 **10368.** **H 1552.** "P est. from diagram." The only measure is:

1905.66	226°.0	40″.74	1*n*	β6	9.3...10.5

32 15 **10370.** **A. G. 259.** Double in *A. G. Lund.* Measures by β6.

32 24 **10372.** τ *Capricorni.* **Hu 200.** Discovered by Hussey with the 36-inch. Change in angle is shown by a subsequent measure:

1905.69	292°.9	0″.18	1*n*	A

The proper motion is small and uncertain:

Auwers	0″.017	in	266°.0
Hedrick	0.017	in	151.3

[Hu (*A. J.* 485)...]

10373. 48 *Cygni.* **Σ 53, App. I.** This star has a proper motion of 0″.057 in 238°.4 (Auwers). Distance slowly increasing. 32^{m} 39^{s}

1868.35	175°.1	179″.15	5*n*	Δ
1891.60	175.5	179.45	3*n*	Mai
1892.19	175.3	179.79	4*n*	Gla
1904.30	175.3	180.02	2*n*	β

[Ra (**XXVI**)...Δ (**II**)...Je (2343)...Maiebckato (*Obsns.* 1892)...Glasenapp (**III**)... β6...]

10375. **See 423.** Nothing later but this: 32 51

1899.60	22°.3	0″.62	3*n*	Cg	8.0...9.0

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10376. **A 742.** No other measures. 32 52

[A (*Bul. L. O.* No. 61)...]

10378. **Σ 2705.** Fixed. 32 57

1867.69	262°.4	3″.00	4*n*	Δ
1883.65	262.1	3.05	4*n*	Per
1894.57	261.5	3.19	2*n*	Gla
1904.58	263.8	3.24	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H1...Wr...H (**IV**)...Se...Ra (**XXVIII**)...Du... Bl (**V**)...Δ (1194)...Δ (**I**, **II**)...Per...Per (2559)...T (2899)...Glasenapp (**III**) ...Knorre (3518)...*Annals Toulouse Obsy.* **III**...Bowyer (*Mon. Not.* **LXVI**, 30)...Lohse (*Pub. Potsdam Obsy.*)...]

10380. **A. G. 260.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546). 32 59

10382. **A 743.** With a later measure the mean is: 33 6

1904.55	307°.0	1″.08	2*n*	A	9.0...12.2

[A (*Bul. L. O.* No. 61)...]

10383. **Hn 39.** No change. 33 7

1887.81	176°.6	7″.53	3*n*	Com

[β4...Com (**VI**)...]

10384. **A 744.** With two later observations the mean is: 33 10

1904.57	269°.5	0″.55	3*n*	A	8.6...8.6

[A (*Bul. L. O.* No. 61)...]

10385. **β 435.** Discovered with the 6-inch. Near β *Delphini.* 33 14

1876.81	124°.0	3″.45	1*n*	OΣ	8.5...10.5
1892.67	116.8	3.08	2*n*	Wilson	8.0...10.8
1898.55	113.3	3.32	3*n*	Doo	8.2...9.4

[β (**VII**)...β (2103)...OΣ (**X**)...Δ (**I**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

33^{m} 16^{s} **10386.** I *Aquarii.* **H 2984.** The principal star is given a proper motion of 0″077 in 104°9 (*A. G. Nico.*). The only measures are:

A and B

1879.45	217°4	55″87	2*n*	β^3	...11.5
1903.72	218.7	57.97	2*n*	β^6	...11.5

A and C

1879.45	38°9	72″90	2*n*	β^3	...11.3
1903.72	37.0	70.94	2*n*	β^6	...11.5

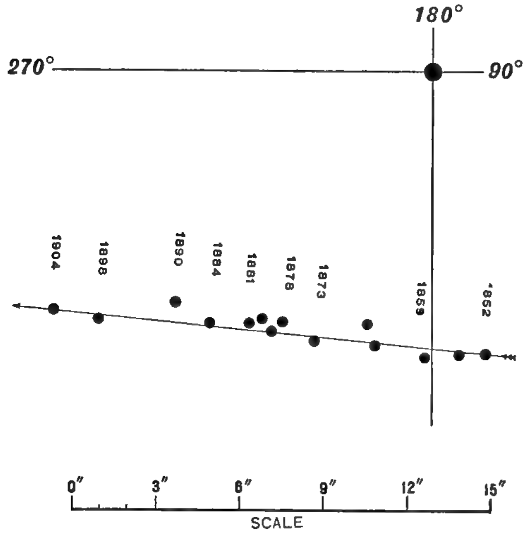
There is a small star near C.

33 16 **10388.** **A. G. 261.** Double in *A. G. Leiden.* Measures by β^6.

33 19 **10390.** *κ Delphini.* **OΣ 533.** The change in the position of the companion corresponds to the proper motion of A.

Auwers	0″298 in 86°5
Newcomb	0.314 in 87.0
Measures of B	0.312 in 85.8

The last value is from the measures of OΣ, Hu, and β.



κ Delphini. OΣ533.

The following positions are shown on the diagram:

1852.47	10°9	10″35	4*n*	OΣ
1856.57	5.4	10.22	1*n*	OΣ
1859.62	359.0	10.32	1*n*	OΣ
1865.78	348.3	10.12	1*n*	OΣ
1868.09	345.7	9.41	3*n*	Δ
1873.71	336.6	10.61	2*n*	OΣ
1877.75	328.4	11.06	3*n*	Δ
1878.18	329.2	10.59	4*n*	β
1880.43	325.9	10.94	5*n*	β
1881.45	324.2	11.27	3*n*	β
1884.63	318.7	12.12	2*n*	Hl
1890.79	312.1	12.51	1*n*	Ho
1898.55	306.7	15.02	3*n*	Hu
1904.69	302.4	16.43	7*n*	β

There is a distant star in the field, 8.8 m in DM, which has exactly the same proper motion as *κ Delphini.*

A and DM (9°) 4602

1865.37	100°70	214″16	12*n*	OΣ	...7.8
1878.25	100.75	214.79	4*n*	Δ	...8.5
1884.33	100.65	214.08	3*n*	En	
1903.72	100.35	214.40	2*n*	β	...8.5

[OΣ (*Mon. Not.* **XX**, 9)...OΣ (**IX, X**, pp. 109, 199)... Δ (**I**)... Flm... Perry (*Eng. Mech.* **XXXVI**, 65)... En (2678)... β^1... β^3... β^4... Ho (3234)... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)... Hu (*Pub. L. O.* **V**)... Lohse (*Pub. Potsdam Obsy.*) ...β^6...]

10392. **Schj. 27.** From list of new pairs by Schjellerup. 33^{m} 27^{s} Apparently fixed. There are several faint stars in the field, the nearest of which is measured below:

AB	1899.87	263°8	6″30	1*n*	Lohse
	1905.54	264.4	6.00	2*n*	β
AC	1905.53	85.4	17.42	1*n*	β

DM (10°) 4340, which 1^{m} *p* and 16′ *s*, is an unequal pair. This is not given in Part I.

1905.54	87°0	2″86	2*n*	β	8.6...11.4

[Schj (1485)... Δ (I)... Hd... *A. G. Leipzig*, p. 211... Lohse (*Pub. Potsdam Obsy.*) ...β^6...]

10394. **Ho 458.** Unchanged. 33 30

1905.56	277°0	1″99	3*n*	Doo

[Ho (3234)...]

10395. **β 288.** Discovered with the Washington 26-inch. 33 31 This star (B. A. C. 7146) has a small proper motion, 0″030 in the direction of 289°1 (*A. G. Berlin*). Near *α Delphini.*

1891.51	162°0	7″71	3*n*	β	6.2...13.2
1899.42	161.3	7.24	2*n*	β	
1905.54	160.8	7.39	2*n*	β	

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β (3114)(*Pub. L. O.* **II**)...β^6...]

10397. **Σ 2707.** Unchanged. 33 59

A and C

1866.03	195°8	55″41	3*n*	Δ
1893.62	195.5	55.37	3*n*	Gla
1905.83	195.4	55.81	3*n*	Doo

A and B

1866.03	31°5	22″84	3*n*	Δ
1893.62	30.9	22.70	3*n*	Gla
1905.83	31.4	22.83	3*n*	Doo

[Ma (*F. S.* **II**)... Δ (**II**)... Glasenapp (**III, IV**)...]

10401. *α Delphini.* **β 298.** (AC = **H 1554.**) The nearest 34 4 star, and some of the others, noted with the Washington 26-inch. The 36-inch shows another and smaller star 14 m, about the same distance as B, in the direction of 335°.

Auwers gives the proper motion of *α Delphini* 0″046 in the direction of 90°0. All the other measures of the several companions are given:

A and B

1898.55	223°8	29″51	1*n*	β
1899.76	223.6	29.19		Gr. Obsy.

A and C (= H 1554)

1828	278°0	35″ ±	1*n*	H
1891.70	280.5	43.81	2*n*	β
1898.55	278.9	43.50	1*n*	β
1899.67	279.5	43.95		Gr. Obsy

A and D

1891.70	150°8	47″95	2*n*	β
1898.55	150.8	47.62	1*n*	β
1899.67	151.8	47.65		Gr. Obsy

A and E

1898.55	308°6	50″91	1*n*	β
1899.65	307.7	51.59		Gr. Obsy

A and F

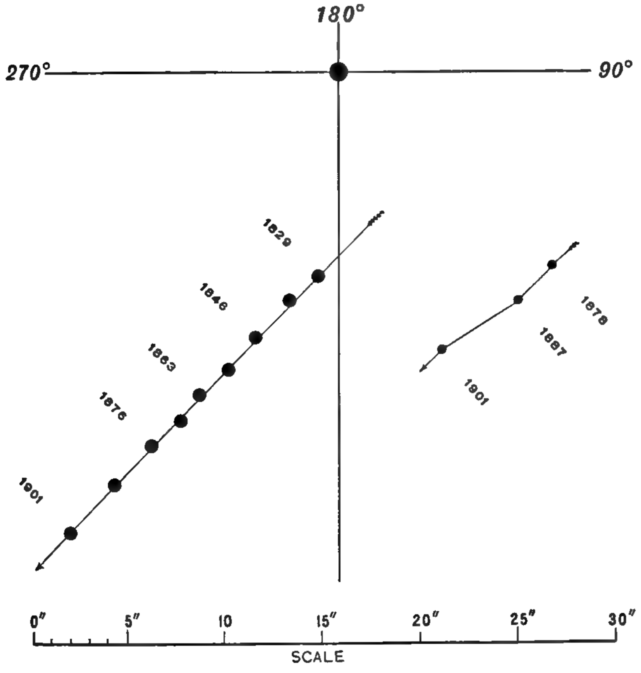
1891.70	114°6	79″79	2*n*	β
1899.67	115.1	79.24		Gr. Obsy

The Greenwich positions are from photographic plates.

[β (**V**)....β (*Mon. Not.* **XXXV**, 31)....β^{1}....β^{3}....β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**) ..Greenwich Obsy. (*Mon. Not.* **LX**, 519)...]

34^{m} 7^{s} **10402.** Σ 2708. (= H N. 87 = **Sh** 326.) The change in the position of the companion exactly corresponds to the proper motion of the principal star. This movement from meridian observations, and measures of the small star, is:

Porter	0″242	in	138°7
Measures Σ — β	0.257	in	135.9



Σ 2708.

1829.86	354°6	10″82	2*n*	Σ
1836.89	348.2	12.23	4*n*	Σ
1846.69	343.2	14.58	3*n*	OΣ
1854.82	340.2	16.52	2*n*	OΣ
1863.02	337.1	18.29	5*n*	Δ
1869.40	336.2	19.91	6*n*	Du
1876.80	333.8	21.75	2*n*	Hl
1887.71	331.9	24.45	2*n*	Hl
1901.32	330.0	27.66	2*n*	β

There is a 13.5 m star in the field, first measured by Hall, which is fixed in space like the Struve star.

1878.27	47°7	14″97	2*n*	Hl
1887.72	37.9	15.10	1*n*	Hl
1901.32	20.3	15.39	1*n*	β

[Σ^{1}...Σ (*Pos. Med.* ccxxxii)...H^{1}...H^{2}...Ma (**XI**)...Ma (*F. S.* **I**)... Bp...Da^{1}....Da^{2}....Da^{3}....Miller (790)....K....K (1519)....Fl....P^{2}....Wr....Se.... Δ (1032, 1116, 1195, 1475)... Δ (**I, II**)... Δ (*Mem. Accad. Sci.*)... Giacomelli (**III**)... OΣ (**IX, X**)... Ba (**II, III**)... Flm (*Études et Lectures* **VI**)... Flm... Bru^{2}...Du...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 2242, 3681) ...WS ...WS^{2}...Gl... Sk... Pl... Bl (**V**)... Je (2407)... En (1674, 2678)... Per... Per (2559)... Hl (*Wash. Obsns.* 1884)... Hl (*A. J.* 302)... Hl (**I, II**)... Sp (**II**)... *Annals Toulouse Obsy.* **III**... Espin (*Mon. Not.* **LXII**, 530)... Sk^{5} ...β^{5}...]

10403. β 1209. Discovered with the 12-inch. It is 22^{s}4 *p* and 0′4 *s* of the 7 m star, B. A. C. 7151. 34^{m} 9^{s}

1898.73	281°2	0″63	2*n*	Cg	9.0...10.5
1899.53	290.0	0.44	3*n*	A	9.0...10.0
1901.66	292.9	0.47	2*n*	Doo	8.7... 9.7

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Cogshall (*A. J.* 478)...A (3639)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

10404. Σ 2709. The change, if any, is small. 34 14

1867.34	310°8	9″17	4*n*	Δ
1879.54	309.2	9.13	1*n*	Cin
1880.63	311.0	9.24	2*n*	β
1887.67	309.6	9.38	1*n*	HΣ
1905.58	307.2	9.54	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^{3}...Cin^{5}...HΣ (**XII**)...β^{6}...]

10405. OΣ 409 *rej.* Rejected in second edition of *Poulkowa Catalogue.* Without change. A more distant star in Glasenapp. 34 16

1888.70	83°4	16″82	1*n*	β
1898.65	84.4	17.01	3*n*	Hu

[Ma (**XI**)...Δ (**I**)...β^{3}...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

10407. **Ho** 135. Nothing later but this: 34 19

1894.23	217°2	2″41	2*n*	Ho

[Ho (2779, 3558)...]

10408. **Ho** 136. Fixed. 34 19

1893.30	3°2	2″56	2*n*	Ho
1905.55	2.5	2.77	3*n*	Doo

[Ho (2779, 3234)...]

10409. Σ 2710 *rej.* Probably fixed. 34 19

1879.53	162°1	18″49	1*n*	Cin°	8.0...10.0
1905.58	163.7	18.86	2*n*	β^{6}	8.4...10.2

10412. H IV. 78. (= Σ 2712 *rej.*) Nothing since Struve but the following: 34 25

1901.68	124°5	28″82	2*n*	β^{5}	8.0...11.9

There is no companion in the Herschel place as given in Part I. In the notation then in use his angle corresponds to 40°6 *nf*. If it is read *sf*, the angle would be 130°6. The principal star is DM (61°) 2039.

34m 39s **10414.** **Σ 2711.** Fixed.

1868.67	222°8	2″41	4*n*	Δ
1894.57	224.6	2.78	2*n*	Gla
1905.81	224.0	2.45	1*n*	β

[Ma (*F. S.* I)... Ma (**XI, XIII**)...H1... OΣ (**IX**) ... UL... En (1518)... Δ (**II**) ... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...β6...]

34 43 **10415.** **Hu 588.** A more recent position is:

1903.50	244°3	1″86	1*n*	Lewis	9.0...11.0

Lewis measures another pair "near Hu 588," place not given:

1903.50	87°1	4″32	1*n*	Lewis	8.5...10.0

[Hu (*Bul. L. O.* No. 27)...Lewis (*Mon. Not.* **LXIV**, 804)...]

34 54 **10417.** **H N. 101.** Nothing since 1793 but the following:

1879.48	322°2	23″35	1*n*	Cin5	8.0...8.5
1905.81	324.2	23.58	3*n*	Doo	8.4...8.8

34 59 **10418.** **Σ 2706.** The angle in Struve appears to be too small. There is no evidence of change.

1843.64	39°6	11″12	2*n*	Ma
1852.68	39.6	.....	2*n*	Ma
1866.72	38.5	11.02	3*n*	Δ
1879.50	36.8	10.98	3*n*	Cin
1905.77	37.8	11.32	2*n*	Doo

[Ma (**XI, XIII**)...Ma (*F. S.* I)...Mh...WS2...Δ (**II**)...Cin5...]

35 1 **10420.** **Weisse 37.** In Weisse, "duplex: comes ad boream." This star has no companion. The description applies to Σ 2708 which is near by.

[β5...]

35 3 **10421.** **A 746.** With a later measure (*Bul. L. O.* No. 61) the mean is:

1904.43	143°2	2″05	3*n*	A	7.5...13.0

35 9 **10422.** **Σ 2713.** Fixed.

1867.05	64°4	4″88	3*n*	Δ
1889.66	63.6	4.85	2*n*	T
1905.79	63.5	5.07	3*n*	Doo

[Ma (*F. S.* I)...Ma (**XI**)...Se...Δ (**II**) ... Cin5... T (3185)... Glasenapp (**II**)... *A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...]

35 10 **10423.** **OΣ 410.** B. A. C. 7158. No material change.

A and B

1869.14	23°8	0″59±	6*n*	Δ
1883.90	23.7	0.54	6*n*	En
1898.66	17.4	0.66	3*n*	Hu
1900.54	18.6	0.62	3*n*	Doo

AB and C

1898.66	69°6	69″15	3*n*	Hu
1900.68	69.6	69.03	3*n*	Do

[Ma (**XI**)...OΣ (**IX, X**)...Se...Hd...Δ (I, pp. 118, 198)...Da3...Per...Per (2560) ....En (2678)....Engelhardt (2785)(**II**)....Renz (*Bul. Acad. St. Petersburg*, 1892)...Glasenapp (**III**)...Brown (3646)...Do (3681)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10425. **Σ 2714.** Fixed. 35m 17s

1866.68	337°4	6″67	3*n*	Δ
1879.58	340.8	6.56	3*n*	β
1902.73	338.6	6.86	1*n*	Bowyer

[Ma (*F. S.* I)....Ma (**XI, XIII**)....Δ (**II**)....β1....β3....Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LXIII**, 414)...]

10426. **Σ 2717.** Very little change, if any. Glasenapp measures a distant star, 52°2 : 46″30 (1898.57) 2*n*. 35 19

1869.22	263°4	2″06	4*n*	Δ
1898.57	261.7	2.20	2*n*	Gla
1904.47	261.2	2.24	1*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...H (**V**)...Δ (**II**)...Glasenapp (**V**)...]

(See p. 1083)

10427. **β 267.** Discovered with the 9.4-inch at the Dartmouth College Observatory. The angle in the measure in β1 is erroneously printed 151°9, the correction for parallel not having been applied. It should be as given here. There is no change in the components. 35 22

1879.29	240°0	2″22	3*n*	Cin	9.0... 9.3
1892.69	241.6	2.04	2*n*	T	9.8...10.0
1898.66	239.9	2.03	3*n*	Bd	9.0... 9.5
1901.06	241.0	2.10	6*n*	Doo	9.6...10.0

[β (**VII**)...β (2103)...β1...Cin5...Cin6...Wilson (Cin10) ... T (3186) ... Boothroyd (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

10428. **H 921.** In the field with β 267. Probably fixed. 35 27

1879.27	219°2	9″53	5*n*	Cin	8.5...8.5
1892.70	219.3	9.21	1*n*	Gla	9.3...9.4

[Cin5...Cin6...Wilson (Cin10)...Glasenapp (**II**)...]

10430. **Ho 137.** Probably unchanged. 35 37

1888.75	273°5	0″88	2*n*	β
1893.25	274.7	1.22	2*n*	Ho
1898.87	281.0	1.05	5*n*	Bowyer
1905.68	279.3	1.23	3*n*	Doo

[Ho (2779, 3234).... β (2930)(*Pub. L. O.* **II**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LXIII**, 403)(*Gr. Obsns.* 1899)...]

10432. **See 425.** A later position is: 35 45

1899.09	224°2	8″01	2*n*	Cg	8.0...11.2

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10433. **A 747.** (AC = **Espin 90.**) With another measure of the close pair the mean is: 35 48

1904.43	134°7	0″28	3*n*	A

The only other observation of the more distant companion is by Espin, 140°1 : 8″3.

[A (*Bul. L. O.* No. 61)...Espin (3784)...]

10434. **A 748.** With other measures the mean is: 35 50

1904.44	25°6	1″35	3*n*	A	7.5...11.8

[A (*Bul. L. O.* No. 61)...]

35m 52s **10435.** **H 2988.** "Large star very red." Color faint with the 6-inch in 1876, and with the 40-inch in 1901.

1901.52	138°6	24″65	2*n*	β^5	8.5...9.6

36 3 **10436.** **Σ 2715.** Fixed.

1866.02	3°0	11″97	3*n*	Δ
1905.55	2.6	12.16	2*n*	β

[Ma (**XI, XIII**)...Ma (*F. S.* **I**)...Δ (**II**)....*A. G. Leipzig*, p. 211...β^6...]

36 11 **10437.** 49 *Cygni.* **Σ 2716.** (= **H̥ II. 98.**) Without change. The large star has a proper motion of 0″018 in 154°5 (Auwers).

1868.14	49°0	2″77	4*n*	Δ
1886.66	50.2	2.77	3*n*	Hl
1890.67	48.4	2.86	6*n*	Giacomelli

[Ma (*F. S.* **I**)...Ma (**IX, XI, XIII, XV**)...Ma (304, 324)...Mh...Bp...Da²...Da³...Se...Wr...Ra (**XXII**)...Δ (*Mem. Accad. Sci.*)...Δ (1032, 1036)...Δ (**I, II**)...Ba (**II, III**)...Pl...Bl (**V**)...WS...Gl...Giacomelli (**III**)...Sp (**II**)...Hl (*Wash. Obsns.* 1886)...Hl (**II**)...T (2899)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Lohse (*Pub. Potsdam Obsy.*)...]

36 29 **10439.** **β 673.** Discovered with the 18½-inch. The *n* star of a wide pair; the other is DM (20°) 4682, 1s9 *f* and 1′7 *s*. These are all the later measures:

1884.62	294°3	4″00	2*n*	HΣ
1893.66	298.3	3.71	3*n*	W
1899.19	296.7	3.96	6*n*	Doo
1901.11	297.2	3.67	2*n*	β

A and C

1901.11	165°1	105″71	2*n*	β

[β (**X**)...β¹...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...β⁵...]

36 31 **10440.** **H 612.** B. A. C. 7167. In B. A. C. 6m. Companion 10m, but distance more than 30″ (1876). Recently measured:

1902.61	9°1	48″31	2*n*	β⁶	6.2... 9.5
1904.71	8.8	47.97	3*n*	Espin	6.5...11.5

[Espin (*Mon. Not.* **LXVI**, 142)...]

36 33 **10441.** **Ho 595.** The only later position is:

1903.24	109°9	17″74	3*n*	Doo

[Ho (3558)...]

36 34 **10443.** **Hn 40.** Probably fixed.

A and B

1888.36	356°9	5″24	3*n*	Com
1896.84	354.3	4.62	2*n*	See

C and D

1888.37	186°5	4″48	3*n*	Com
1896.84	186.9	4.28	2*n*	See

[β⁴...Com (**VI**)...See (3496)...]

10447. **Σ 2718.** (= **S 760.**) Fixed. A distant 8m star measured by Glasenapp, 345°7 : 166″96 (1889.68) 2*n*. 36m 52s

1867.52	86°8	8″28	4*n*	Δ
1888.72	87.2	8.24	2*n*	T
1891.01	86.2	7.93	6*n*	Gla

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII**)...Ma (324)...H¹...H (**IV**)...Ra (**XXIII**)...Wr...Se...Du...Δ (1209)...Δ (**I, II**)...T (2991)...Glasenapp (**I, II, III**)...*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...]

10449. **H 1560.** The only measures are: 37 5

AB	1905.93	246°2	11″13	2*n*	Es	9.0...11.5
AC	1905.93	74.3	24.98	2*n*	Es	...13.0

[Espin (*Mon. Not.* **LXVI**, 142)...]

10452. **H 2991.** (= **See 426.**) The measures are of recent date: 37 20

A and C

1890.57	205°7	31″81	2*n*	Gla	9.5... 9.2

A and B

1899.70	87°7	7″19	2*n*	Cg	8.5...10.5

The measures of the same date by See have different angles and distances in the two references given below.

[Glasenapp (**I**)...See (3496)(*A. J.* 431)...Cogshall (*A. J.* 486)...]

10453. *a Cygni.* **H̥ N. 73.** (= **H 1563.**) The large star has no sensible proper motion, 0″007 in 252°6 (Auwers). The measure by Bond has a large error, or belongs to some other star. The following are all the observations: 37 20

1790.69	90° ±	60″ ±	1*n*	H̥
1828+	105.8	.....	1*n*	H
1848.41	88.6	95.5	1*n*	Bond
1879.35	106.0	75.45	3*n*	β
1895.92	106.6	75.72	3*n*	A
1903.26	105.9	75.35	2*n*	β

[H (**IV**)...Bond (*Am. Acad.* **II**, 144)...Hd...β³...A (3396)...β⁶...]

10454. **A. G. 263.** Double in *A. G. Lund.* Measures by β⁶. 37 29

10455. **Hn 162.** No change. 37 33

1905.79	143°4	1″83	3*n*	Doo	9.2...9.6

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

10456. **See 427.** Looked for at the Lowell Observatory several times in 1899 by Cogshall, but no companion seen. 37 37

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10457. **H 1567.** The following are all the measures: 37 42

1890.56	345°1	31″33	2*n*	Gla	7.6... 9.7
1905.57	345.2	30.51	2*n*	β	8.0...10.5

[Glasenapp (**I**)...β⁶...]

37^m 53^s **10459.** **β 674.** Discovered with the 18½-inch. Probably fixed.

1892.79	99°9	1″19	1*n*	Ho
1897.80	103.1	1.69	1*n*	See
1898.67	100.9	1.46	4*n*	Doo
1898.67	102.8	1.59	3*n*	Cogshall

[β (X)...β^1...Cin^6...Ho (3234)... See (3496) ... Doolittle (*Pub. Flower Obsy.* I) ...Cogshall (*A. J.* 478)...]

37 56 **10461.** **Σ 2720.** Fixed. Proper motion 0″033 in 18° (*A. G. Berlin*).

1866.00	183°3	3″92	3*n*	Δ
1894.56	182.9	3.90	2*n*	Gla
1905.78	182.5	3.99	3*n*	Doo

[Ma (*F. S.* I)...Δ (II)...β^1...Glasenapp (III)... *Annals Toulouse Obsy.* III...]

38 0 **10463.** **H 1565.** The only measure is:

1901.43	71°2	18″08	1*n*	β^6	8.5...9.0

38 3 **10464.** **H 5218.** "Very beautiful object." No late measure.

1877.76	194°6	10″11	1*n*	Cin^4	7.0...11.0

38 5 **10465.** **Σ 2721.** Without change.

1866.43	33°3	2″53	3*n*	Δ
1901.48	30.7	2.74	1*n*	Hu

[Ma (*F. S.* I)...Ma (XI, XIII)...Se...Δ (II)...]

38 10 **10467.** **Σ 2722.** (= **H** 2993.) Fixed.

1865.64	307°5	7″07	3*n*	Δ
1901.48	307.8	7.42	1*n*	Hu

[Ma (*F. S.* I) ... Ma (XI, XIII) ... Wr ... Se... Ferr... Δ (II)...*Annals Toulouse Obsy.* III...]

38 14 **10469.** **Ho 138.** No other measures.

[Ho (2779)...]

38 13 **10470.** **H 1568.** The only later position is:

1905.93	43°8	11″19	2*n*	Es	8.7...11.5

[Espin (*Mon. Not.* LXVI, 143)...]

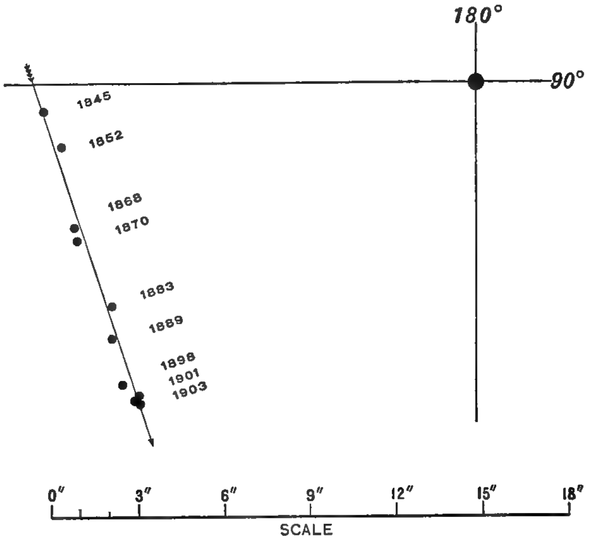
38 17 **10472.** **Hn 163.** A third 12m star was noted by Comstock, 230° : 10″. Nothing later but the following:

AB	1905.64	102°2	2″09	1*n*	β	
AC	1905.64	239.3	17.77	1*n*	β	...13

[Hn (*Pub. Washburn Obsy.* II)...Com (VI)...β^6...]

38 17 **10473.** **OΣ 411.** The measures of the companion give the principal star a proper motion of 0″191 in 197°0.

1845.36	273°7	15″26	2*n*	OΣ
1852.11	278.7	14.80	3*n*	OΣ
1868.40	289.8	14.69	4*n*	Δ
1870.92	291.5	15.02	1*n*	OΣ
1883.90	301.5	14.99	6*n*	En
1889.43	305.0	15.60	3*n*	HΣ



OΣ 411.

1898.51	310°4	16″26	3*n*	Hu
1901.57	312.9	16.61	2*n*	β
1901.57	312.9	16.40	4*n*	Doo
1903.56	313.7	16.26	3*n*	Do

[Ma (XIII)...OΣ (IX)...Δ (I)...En (2678)...Flm...Sk^2...Hu (*Pub. L. O.* V)... HΣ (XII)...Do (3931)...Doolittle (*Pub. Flower Obsy.* I)...β^5...]

10474. **H 2992.** "Very neat." There is probably an error in the early distance. 38^m 23^s

1877.70	139°4	5″55	1*n*	Cin	8.0...8.2
1878.75	135.9	....	2*n*	Cin	9.0...9.5
1905.78	140.2	3.06	3*n*	Doo	8.9...9.7

[Cin^4...Cin^5...]

10476. 51 *Cygni.* **β 675.** Discovered with the 18½-inch. 38 31
The large star has a proper motion of 0″031 in the direction of 93°7 (Auwers). As this is nearly in the direction of B, its distance, if fixed in space, should decrease annually by that amount. This movement of A during the time covered by the measures would be 0″6. The observations tend to show an increasing distance, and it is probable that the two stars form a physical system.

The following are all the other measures:

A and B

1885.54	103°4	3″25	2*n*	HΣ
1889.45	101.5	2.99	3*n*	β
1898.63	102.3	3.16	3*n*	A
1899.55	102.2	3.23	1*n*	Hu

A and C

1898.60	182°5	25″94	3*n*	A
1899.55	182.2	25.96	1*n*	Hu

A and D

1898.60	328°9	33″43	3*n*	A

[β (**X**)...β^1...β (2957)(*Pub. L. O.* **II**)...HΣ (**XII**)... A (3585)... Hu (*Bul. L. O.* No. 44)...]

38^m 42^s **10477.** **Arg. 39.** This star is described "duplex, 30″" in O. Arg. N. In 1876 I looked it up, and estimated the distance as 20″. As the components are now separated by less than 10″, there may be some change from proper motion. These stars are DM (48°) 3193 and 3194. The following are all the other observations:

1901	108°6	10″1	1*n*	Es	8.3...8.6
1903.22	109.8	9.62	2*n*	β	8.4...8.6
1905.76	112.5	9.60	2*n*	β	

The *A. G.* positions give the distance 12″24 (1877.2).

[Espin (3784)...β^6...] (See p. 1083)

39 1 **10479.** **H 925.** The only measure is:

1905.64	175°3	10″25	1*n*	β^6	9.5...9.8

39 5 **10480.** **A 171.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

39 7 **10482.** **Ho 139.** No motion.

1895.72	215°1	5″37	1*n*	Ho
1905.64	214.1	5.46	3*n*	Doo

[Ho (2779, 3558)...]

39 11 **10483.** **Σ 2723.** *Delphini* 43. Slow motion in angle. Two faint companions in 45°.

1848.66	87°3	1″41	3*n*	OΣ
1866.76	92.2	1.22	4*n*	Δ
1887.08	98.9	1.42	3*n*	HΣ
1887.84	95.8	1.22	2*n*	Hl
1898.80	100.0	1.18	3*n*	Maw
1904.87	99.6	1.44	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**IX, X, XI**)...Se...Se^3...OΣ (**IX**)...Da^3... Δ (1125, 2195)... Δ (**I, II**)...Flm ..β^1...T (2991)...Hl (**II**)...Maw (**I, III**)...Glasenapp (**II**)... Do (3681)...HΣ (**XII**)...Bowyer (*Mon. Not.* **LXVI**, 30) ..]

39 12 **10484.** 17 *Capricorni.* **H 2994.** "Requires verification." I have examined this star with the 18½-inch several times under favorable conditions in 1877, and in 1901 with the 40-inch, and it is safe to say the suspected companion has no existence. There is a small proper motion, 0″018 in 213°0 (Auwers).

[β (*Mon. Not.* **XXXIV**, 379)...β^5...]

39 12 **10485.** **Σ 2724.** (= **S** 761.) No material change.

1868.41	326°9	2″32	4*n*	Δ
1893.68	329.2	2.60	2*n*	Gla

[Ma (*F. S.* **I**)....Ma (**XI**)....Da^2....Se....Δ (**II**)....Glasenapp (**III**)....*Annals Toulouse Obsy.* **III**...]

10486. **H 5220.** B. A. C. 7181. Probably fixed. 39^m 17^s

1879.23	354°2	17″92	3*n*	Cin	7.5...8.8
1890.55	354.4	17.79	2*n*	Gla	7.0...8.9
1897.70	354.8	17.99	2*n*	See	6.4...9.6

[Cin^4...Cin^5...Cin^6...Glasenapp (**I**)...See (3496)...]

10487. **β 64.** (AC = **OΣ (App) 209.**) The close pair was discovered with the 9.4-inch of the Dartmouth College Observatory. There appears to be slow direct motion in angle. The measures show no change in the distant star C. 39 18

A and B

1876.20	172°4	0″63	6*n*	Δ
1891.84	180.3	0.65	4*n*	β
1894.16	187.9	0.50	3*n*	Sp
1897.57	183.8	0.57	1*n*	Bowyer
1897.82	186.3	0.49	1*n*	Dyson
1897.83	186.9	0.55	1*n*	Brown
1898.71	184.0	0.61	3*n*	A
1898.75	188.6	0.55	1*n*	Lewis
1899.65	182.9	0.46	5*n*	Bowyer
1903.98	193.4	0.64	1*n*	Biesbroeck
1904.78	191.4	0.48	3*n*	Doo

AB and C (= OΣ (App) 209)

1891.84	158°1	96″45	3*n*	β
1898.68	157.8	96.60	2*n*	A

There is a small star nearer AB, which has been measured from the close pair as follows:

1874.25	119°3	.....	1*n*	Δ	...10.7
1891.84	118.9	62″22	2*n*	β	...10.5

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....β (3114)(*Pub. L. O.* **II**)....Δ (2086).... Sp (**III**)....Δ (**I**)....Perry (*Eng. Mech.* **XXXVI**, 65)....Lewis, Bowyer and Dyson (*Mon. Not.* **LIX**, 400; **LX**, 513)....A (3585).... Brown (3646).... Biesbroeck...Doolittle (*Pub. Flower Obsy.* **II**)...]

10488. **β 152.** *Cephei* 55. Discovered with the 6-inch. There may be some change in the angle. This is Radcliffe 4932. The following are all the measures: 39 18

1876.01	111°0	0″45	5*n*	Δ
1878.53	112.3	0.55	1*n*	β
1885.57	110.1	0.56	2*n*	HΣ
1885.73	118.8	0.86	1*n*	Young
1889.40	107.5	0.60	6*n*	Sp
1897.90	106.8	0.50	1*n*	Brown
1898.68	103.6	0.67	3*n*	A
1901.08	99.1	0.54	6*n*	Doo
1903.92	106.1	0.63	2*n*	Biesbroeck

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....β^1....Δ (**I**) ....Δ (2086)....Sp (**III**).... A (3585)....HΣ (**XII**)....Brown (3646)....Biesbroeck.... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **I, II**)....]

10489. **A 172.** No later measures. 39 28

[A (3741)(*Bul. L. O.* No. 3)...]

10490 **β 1302.** C is DM (22°) 4169. No other measures. 39 32

[β^5...]

$39^{m}\ 42^{s}$ **10492.** **Ho 140.** Probably unchanged. The later measures are:

1894.27	310°5	6″80	2*n*	Ho
1901.61	314.7	7.05	1*n*	β

[Ho (2779, 3234, 3558)...β6...]

(See p. 1083)

39 46 **10494.** **Skinner 11.** (= **Innes 300.**) Discovered by Skinner with the Washington transit, and afterwards independently by Innes.

1900.55	297°7	3″84	3*n*	Doo
1901.85	299.1	3.93	1*n*	Innes
1902.12	297.3	3.78	6*n*	Doo

[β5...Innes (3501)(*Mon. Not.* **LXII**, 478)(*Annals Cape Obsy.* **II**)...Boeger (*A. J.* 522)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

39 48 **10495.** **β 834.** Discovered with the 15½-inch at the Washburn Observatory. The other measures are:

1886.86	131°7	1″97	4*n*	UL
1887.81	133.3	2.14	3*n*	Com
1898.68	130.9	2.41	4*n*	Doo

[β (**XII**)...β4...UL...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

39 58 **10496.** **Hn 164.** No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

40 2 **10498–9.** **H 1573 and H 1574.** "A double-double star; a curious object." The only observation since is:

H 1573	1905.68	276°3	2″75	1*n*	β6	9.6... 9.7
H 1574	1905.68	161.1	14.74	1*n*	β6	10.3...12.0

The descriptions do not fully correspond, but the pairs measured are in the Herschel place, and there is nothing else near.

40 10 **10500.** **β 153.** B. A. C. 7187. Discovered with the 6-inch. Perhaps some change in the angle.

1877.70	282°7	1″34	1*n*	Cin
1882.62	286.0	1.65	2*n*	Wilson
1892.61	285.5	1.39	1*n*	Wilson
1894.73	280.0	0.89	1*n*	Sellors
1897.13	278.1	1.55	3*n*	See
1897.68	273.0	1.55	2*n*	Scott
1898.71	274.1	1.38	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Cin3...Cin4...Wilson (Cin10)...Sellors (3303)....See (3496)....Doolittle (*Pub. Flower Obsy.* **I**)....Scott (*Mon. Not.* **LIX**, 427)...]

40 25 **10501.** **A. G. 264.** Double in *A. G. Berlin.*

1904.54	357°2	1″95	2*n*	Bowyer

[Miller (*A. J.* 546)...Bowyer (*Mon. Not.* **LXVI**, 30)...]

40 30 **10502.** **A 173.** No later measures.

[A (3741)(*Bul. L. O.* No. 3)...]

10504. **Σ 2725.** (= **H II. 66 = S 764.**) The relative change appears to be due to the difference in the proper motions. $40^{m}\ 37^{s}$

A = 0″121 in 49°5 } *A. G. Berlin*
B = 0.100 in 60.0 }

1783.29	348°7	....	1*n*	H
1829.80	358.0	4″24	3*n*	Σ
1839.86	354.0	4.58	3*n*	OΣ
1842.62	357.1	4.79	4*n*	Ma
1844.62	355.8	4.61	2*n*	OΣ
1867.34	359.4	4.71	4*n*	Δ
1868.55	359.8	4.77	5*n*	Du
1882.15	361.2	5.08	6*n*	Hl
1889.69	362.0	5.00	3*n*	Gla
1890.60	362.4	5.14	3*n*	Giacomelli
1901.76	364.1	5.41	5*n*	Sk

[Σ1...Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII**)...H (**IV**)...Bp...Da3...Wr...Se...Ferr...K...Ra (**XXIV**)...Flm... Ba (**II, III**)...Kn...Sk2...Du...Δ (*Mem. Accad. Sci.*)...Δ (1032)...Δ (**I, II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 2242, 3023, 3681)...OΣ (**IX, X**)...Sp (2133)...Sp (**II**)...Giacomelli (**III**)....Hl (*Wash. Obsns.* 1884)....Hl (**I, II**)....UL....Per....Per (2559)....T (2866)...Je (2449, 2772, 3802)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Maw (**I, IV**)...Glasenapp (**II, III**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Thiele (3837)...Sk6...Lohse (*Pub. Potsdam Obsy.*)...]

10505. **O. Stone 53.** The other measures are: 40 40

1878.72	176°1	17″13	1*n*	Cin
1885.70	177.0	17.27	1*n*	Wilson

[Cin4...Cin5...Wilson (Cin10)...]

10506. 52 *Cygni* **Σ 2726.** (= **H II. 25 = S 762.**) Without change, but later observers make the angle a little larger. Some of the distances are very uncertain. 52 *Cygni* has a proper motion of 0″035 in 343°0 (Auwers). 40 43

1862.26	61°2	6″44	2*n*	OΣ
1866.40	60.1	6.47	4*n*	Δ
1887.90	61.5	6.54	2*n*	T
1892.07	61.5	6.37	4*n*	Gla
1895.78	63.4	6.28	2*n*	Collins

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV, VII**)...Wr...Se...OΣ (**IX**)...Δ (**II**)...Bl (**V**)....Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)....WS....WS2....Gl....Sk2...En (2678)...T (2899)...Ho (3234)...Glasenapp (**III**)...Pk...Collins (*A. J.* 378)...Sk5...Lohse (*Pub. Potsdam Obsy.*)...]

10508. **β 471.** Discovered with the 6-inch. Probably unchanged. 41 1

1893.79	308°0	1″97	3*n*	Wilson	10.0...10.3
1898.45	307.0	1.78	3*n*	Doo	10.3...10.9

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (**I**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

10509. γ *Delphini.* **Σ 2727.** (= **H III. 10 = Sh 327.**) The relative change is very slow, but the components have a considerable common proper motion: 41 6

Auwers	0″201 in 193°7
Bossert	0.204 in 192.2

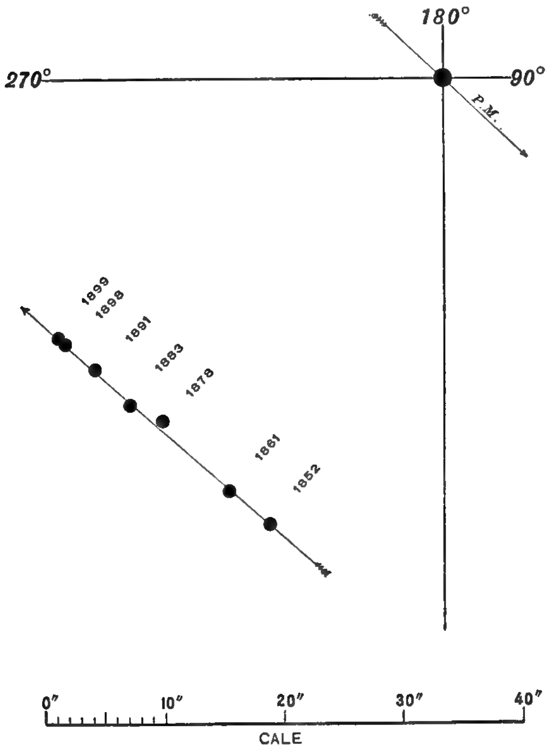
1830.89	273°7	11″90	5*n*	Σ
1851.84	273.8	11.75	2*n*	OΣ
1866.21	272.0	11.39	3*n*	Δ

1868.28	272°4	11″32	6*n*	Du
1883.61	270.9	11.20	4*n*	Per
1887.22	270.1	11.16	20*n*	Hl
1902.66	271.0	11.16	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (324)....Ma (**IX, X, XI, XIII**)....BM (280)....Bes....H²....Bp...Da¹...Da⁴...Wr...K...K (409)...Se...Se³...Ek (**I, III**)...Peters (1042)...Lu (1103)...Lu (**I, II, III**)...Auwers (1393)...Ra (**XXIII**)...Ba (**II**)...Hd...Pk...Flm...Pogson (*Brit. Ass'n Rep.* 1858)...Wh...Du...Kn...WS...Gl...Sk²...Giacomelli (**III**)...Pt...OΣ (**IX**)...Δ (1194, 2195)...Δ (**I, II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Do (2242, 3023, 3681)....Big....Schur (2255)...Per...Per (2559)...Franz (2590)...Goldney (2257)...de Ball (2753)...T (2866)...Je (2407, 2449, 2772)...Knorre (*Beob. Berlin*, No. 6, 1892)...Elger (*Mon. Not.* **XXX**, 103)...Hl (*Wash. Obsns.* 1884–86)...Hl (**I, II**)...Engelhardt (**II**)....Maw (**I**)....Glasenapp (**II, III**)....Cohn (3240)....Hagen (3258)....Chofardet (3450)....Coleman (*Mem. R. A. S.* **LIII**)....*Annals Toulouse Obsy.* **III**...Thiele (3837)...Sk⁵...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...Lau (4078)...]

$41^{m}\ 6^{s}$ **10510.** **A. G. 265.** Double in *A. G. Lund.* Measures by Espin (*Mon. Not.* LXII, 533).

41 21 **10512.** ϵ *Cygni.* **β 676.** Discovered with the 18½-inch. The large star has a considerable proper motion, 0″481 in the direction of 46°5 (Auwers). This corresponds with substantial exactness to the displacement of the companion shown by the measures. The small star had been seen by OΣ as appears by his observations published long after β (X). The following are all the measures:



ϵ Cygni. β 676.

1852.63	338°8	40″69	1*n*	OΣ
1861.63	332.6	39.64	1*n*	OΣ
1878.08	320.9	37.72	2*n*	β
1883.60	316°5	38″66	2*n*	HΣ
1891.52	310.3	38.68	3*n*	β
1898.31	305.3	39.22	2*n*	β
1898.59	305.2	39.14	3*n*	A
1899.52	304.2	39.48	5*n*	Doo

These measures give 0″508 in 48°4 for the most probable value of the proper motion of ϵ *Cygni.*

[β (**X**)....β¹....β (3114)(*Pub. L. O.* **II**)....OΣ (**X**)....A (3585)....Doolittle (*Pub. Flower Obsy.* **I, II**)...]

10514. **S 763.** (= σ 693 = ℌ N. 10 = **H** 2996 = **H** 3002.) $41^{m}\ 35^{s}$
Error of 4^{m} R. A. in H 3002, and angle reversed. Magnitudes variously rated; 9...9+ in H 2996; 6 m in B. A. C. Probably fixed.

1878.05	294°3	15″79	3*n*	Cin	6.5...7.2
1882.47	294.7	15.86	1*n*	W	7.0...7.5
1903.49	294.4	15.70	3*n*	β	7.0...7.1

There is a pair of small stars in the field about 7′ *s*:

1903.48	158°7	9″38	2*n*	β	10.3...10.5

[Ra (**XXXII**)...Cin⁴...Cin⁵...Wilson (Cin¹⁰)...β⁶...]

10516. **Kr 51.** Noted as "duplex" in *A. G. Hels.* A later position is: 41 38

1899.26	181°3	1″42	5*n*	Doo	9.2...9.8

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

10517. **Ho 141.** No motion. A third star 13 m, 69°: 24″7. 41 39

1893.69	286°8	1″12	1*n*	Ho
1905.68	288.3	1.21	6*n*	Doo

[Ho (2779, 3558)...]

10518. **A 174.** No other measures. 41 51

[A (3741)(*Bul. L. O.* No. 3)...]

10519. **β 364.** Discovered with the 6-inch. In a low-power field with 30 *Vulpeculae.* The later measures appear to show a little change. 41 52

1876.17	219°3	1″06	4*n*	Δ
1892.75	220.5	1.25	2*n*	Ho
1898.64	223.3	1.31	3*n*	Doo
1904.00	226.8	1.35	2*n*	Biesbroeck

[β (**VI**)....β (2062)....Δ (**I**)....Ho (3234)....Doolittle (*Pub. Flower Obsy.* **I**)....Biesbroeck...]

10520. 13 *Delphini.* **β 65.** Discovered with the 6-inch. The measures do not show any material relative change. The proper motion of this star is very small, 0″010 in the direction of 95°5 (Auwers). 41 52

These are all the other measures:

1876.85	178°6	1″42	1*n*	OΣ	6.0...10.0
1878.47	186.3	1.72	3*n*	Sp	5.2... 9.0
1884.62	187.3	1.76	2*n*	HΣ	
1887.40	188.8	1.59	4*n*	T	5.2... 9.0
1888.65	186.8	1.49	1*n*	Lv	5.0... 9.2

1888.70	187°1	1″54	2*n*	T	
1895.62	189.7	1.41	3*n*	Coleman	
1897.84	188.4	1.48	2*n*	Brown	
1898.62	189.1	1.42	3*n*	Doo	6.4... 7.7
1900.68	188.2	1.40	2*n*	Maw	

[β (I)...β (*Mon. Not.* **XXXIII**, 351)... Δ (I)... Δ (2081)... HΣ (**XII**)... OΣ (**X**)... Sp (**II**)... T (2866)... Lv 1... Doolittle (*Pub. Flower Obsy.* **I**)... Brown (3646)...Coleman (*Mem. R. A. S.* **LIII**)...Maw (**IV**)...]

42m 1s **10523.** **OΣ** 412 *rej.* No early measures. Not measurable by Dembowski in 1866.

AB	1901.30	281°0	25″27	3*n*	β	7.3...
BC	1901.30	7.4	4.88	3*n*	β	10.9...10.9

[Δ (I, p. 230)...Espin (3717)...Hu (*Pub. L. O.* **V**)...β5...]

42 4 **10524.** **A. G.** 266. Double in *A. G. Leiden.* Measures by β6.

1904.82	86°7	10″89	1*n*	Espin

[Espin (*Mon. Not.* **LXVI**, 144)...]

42 5 **10525.** **Hn** 41. The only later measures are:

AB	1887.82	233°6	3″39	1*n*	Com
AC	1887.81	260.1	7.92	3*n*	Com

[β4...Com (**VI**)...]

42 18 **10526.** **H** 2998. The principal star has a proper motion of 0″392 in 140°0 (Bossert).

1897.75	140°7	6″16	1*n*	See	8.1...8.5
1903.49	140.4	5.95	3*n*	β	8.8...8.9

[See (3496)...β6...Innes (*Annals Cape Obsy.* **II**)...]

42 23 **10527.** **β** 677. *T Cygni.* The nearest companion was detected with the 18½-inch; the other with the 36-inch. The variability of this star was discovered by Schmidt; period supposed to be about one year, 5½ to 6m. The Harvard photometric magnitude is 5.2. Ball measured a distant star in his examination for parallax (*Dunsink Obsns.* III).

All the other measures are given:

		A and B		
1881.71	119°8	9″65	3*n*	Ho
1885.55	117.7	10.15	1*n*	HΣ
1890.52	120.9	9.91	3*n*	β
1898.31	120.7	9.88	2*n*	β
1899.77	121.4	10.31		Gr. Obsy.
1901.57	119.8	9.94	3*n*	Doo
		A and C		
1898.31	195°9	12″46	2*n*	β
1899.77	196.2	12.66		Gr. Obsy.

The measures at Greenwich are from photographic plates.

[β (**X**)....β1....β (3048)(*Pub. L. O.* **II**)....Ho (2978)....HΣ (**XII**)....Greenwich Obsy. (*Mon. Not.* **LX**, 519)...Doolittle (*Pub. Flower Obsy.* **II**)...]

42 23 **10528.** **A. G.** 267. Double in *A. G. Albany.* Measures by Miller (*A. J.* 554).

10530. **H** 3000. Only this since Herschel: 42m 32s

1905.64	243°9	31″56	1*n*	β6	7.0...13.5

The proper motion is 0″020 in 197°0 (Hedrick).

10531. **Ho** 143. "An exceedingly difficult pair." Hough found it somewhat uncertain in 1887 and 1896. There are no measures. 42 36

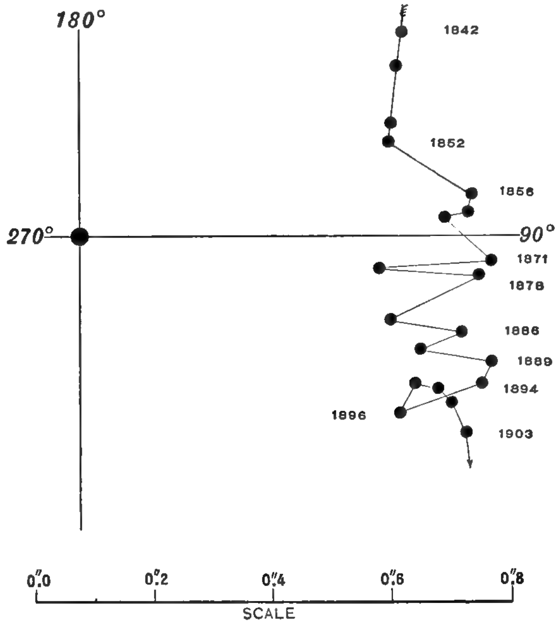
[Ho (2779, 3558)...] (See p. 1083)

10532. **Ho** 142. "Approximate place. A 6m star 15′ *s* and 1m 47s *p*." The 6m star is evidently Schj. 8274, and the double Lalande 40169. 42 37

1905.67	9°0	0″80	1*n*	Doo	8.0...10.0

[Ho (2779)...]

10533. λ *Cygni.* **OΣ** 413. (AC = **H** VI. 32 = **S** 765 = σ 696.) The relative change in the close pair is very slow. It may prove to be a binary, but the measures of the last sixty years show nothing but a rectilinear motion of 0″01 in the direction of about 180°. The proper motion of the components from meridian observations is very small, and consequently very uncertain in amount and direction. This is given: 42 44



λ Cygni. OΣ 413.

Auwers	0″014 in 293°5
Newcomb	0.012 in 118.1

If this is a physical system, it will require the measures of another century or two to give an approximate orbit. If it is a case of proper motion, it may sufficiently appear when the observed arc has been doubled.

The following references relate to the relative motion:

1888	Glasenapp	93.4 yrs.	*Orbites, etc., Cat. Poulk.*
1896	Burnham	Indeterminate	*Pop. Ast.* IV, 397
1900	Hussey	Proper motion	*Pub. L. O.* V, 169

The following selected measures are sufficient to show the nature of the movement since 1842:

1842.66	122°3	0″65	4*n*	OΣ
1845.18	118.1	0.61	3*n*	OΣ
1848.80	109.5	0.56	4*n*	OΣ
1852.02	106.8	0.55	4*n*	OΣ
1856.98	95.6	0.67	3*n*	OΣ
1860.97	93.4	0.66	3*n*	OΣ
1869.68	92.6	0.62	7*n*	Du
1871.75	86.3	0.70	2*n*	OΣ
1877.70	83.6	0.51	5*n*	Δ
1878.42	84.2	0.68	6*n*	Hl
1883.18	74.3	0.55	7*n*	En
1886.86	75.5	0.67	9*n*	Hl
1888.91	71.3	0.61	8*n*	Sp
1889.32	72.7	0.73	6*n*	HΣ
1894.32	69.4	0.84	12*n*	Big
1894.70	69.9	0.61	12*n*	Com
1896.54	60.7	0.62	3*n*	A
1897.85	65.8	0.62	3*n*	A
1898.67	66.5	0.66	10*n*	Hu
1900.60	65.7	0.69	3*n*	A
1903.63	62.8	0.73	1*n*	Biesbroeck

There is no change in the distant Herschel star:

AB and C

1825.08	104°5	85″59	3*n*	S
1852.99	105.1	85.38	5*n*	OΣ
1873.70	105.1	85.06	5*n*	OΣ
1880.53	105.2	85.03	2*n*	β

[Ma (**XIII**)... J 3... Da3... Da4...WJ 2... Flm... Δ (1116, 2193)... Δ (**I**, pp. 110, 200).... OΣ (**IX**, **X**, pp. 47, 197).... Burton (*Copernicus* **I**, 54).... Du.... WS.... WS 2.... Sk.... Sk2.... Sk3.... Do (*Trans. R. I. Acad.* **XXIX**, Part 13).... Do (2242, 2322, 3023, 3466, 3681)... Bl... Sp (2133)(**II**, **II** App.)... Per... Per (2529) ... Perry (*Eng. Mech.* **XXXVI**, 65)... Kustner (2584)... Ho (2978)... T (2866, 2899)... Hl (*Wash. Obsns.* 1885-86)... Hl (*A. J.* 302)(**I**, **II**)... En (2678)... β 1 ... β 3... Glasenapp (2940)(*Orbits, etc., Cat. Poulk.*)... Glasenapp (**III**)... Big (*Bul. Ast.* **XII**, 299)... Maw (**I**)... Com (**X**)... See (*A. J.* 359)... Lv (*A. J.* 407) .... β (*Pop. Ast.* **IV**, 397).... Hu (*A. J.* 427)(*Pub. L. O.* **V**)(*Bul. L. O.* No. 40) ... Doolittle (*Pub. Flower Obsy.* **I**)... Gl (*Mon. Not.* **LXI**, 556)... HΣ (**XII**)... Callandreau (*Bul. Ast.* **XII**, 523)... Biesbroeck... Lewis (*Mon. Not.* **LXVI**, 30) ... Lohse (*Pub. Potsdam Obsy.*)... A (3396)(*A. J.* 429)(*Bul. L. O.* No. 11)...]

$42^{m}\ 50^{s}$ **10534.** **OΣ 414.** No change.

1868.28	95°3	9″94	4*n*	Δ
1884.49	94.7	10.01	7*n*	Per
1897.80	94.5	9.95	3*n*	Doo
1897.84	95.1	10.12	5*n*	Hu

[Ma (**XI**, **XIII**)... OΣ (**IX**)... Δ (**I**)... Du... Sk2... Big... Per... Per (2529, 2560)... Doolittle (*Pub. Flower Obsy.* **I**).... Glasenapp (**V**).... Do (3681).... Hu (*A. J.* 397)(*Pub. L. O.* **V**)...]

42 51 **10535.** *η Cephei.* This star has a proper motion of 0″816 in the direction of 6°7 (Auwers). The change shown by the recent measures corresponds to this movement of A.

1879.35	33°8	100″54	2*n*	β 3
1900.71	38.6	85.24	2*n*	β 5

These measures give 0″803 in 9°2 for the proper motion of A.

(See p. 1083)

10536. **H 5226.** Probably unchanged. $42^{m}\ 54^{s}$

1877.68	67°5	18″76	2*n*	Cin	7.2...8.7
1890.53	66.6	17.98	2*n*	Gla	6.8...8.5
1897.11	67.2	18.87	3*n*	See	7.8...9.7

[Cin4... Glasenapp (**I**)... Scott (*Brit. Ast. Ass'n* **V**, 75)(*Mon. Not.* **LXIV**, 52)... See (3496)...]

10538. **β 66.** Discovered with the 6-inch. The later measures show no change. 42 59

1883.16	159°5	1″57	5*n*	En
1890.84	161.7	1.57	2*n*	Maw
1898.70	159.5	1.16	4*n*	Doo

[β (**I**)... β (*Mon. Not.* **XXXIII**, 351)... Δ (**I**)... En (2678).... Maw (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10539. **Ho 459.** Nothing since 1893 but the following: 43 2

1905.68	4°9	0″64	3*n*	Doo	9.7...10.8

[Ho (3234)...]

10540. **Σ 2728.** The principal star appears to have, from the measures, a proper motion of 0″033 in 204°2. At one time these stars formed a close pair. The following are all the measures: 43 5

1831.82	24°7	4″22	3*n*	Σ
1843.74	24.3	4.48	1*n*	Ma
1867.41	24.5	5.17	4*n*	Δ
1887.68	23.5	6.00	2*n*	HΣ
1889.69	24.9	6.05	4*n*	Hl
1894.57	23.4	6.24	2*n*	Gla
1903.60	25.5	6.52	4*n*	Do
1905.71	25.4	6.65	2*n*	β

The 40-inch shows a 13.8 m star, 213°5 : 18″61 (1905.74) 1*n*.

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (**II**)... Flm... Hl (**II**)... Δ (2195)... Glasenapp (**III**)... HΣ (**XII**)... Do (3931)... β 6...]

10542. **β 268.** Discovered with the 9.4-inch at the Dartmouth College Observatory. About 21′ *n* is OΣ 414. The later measures show no certain change. 43 11

1884.31	216°2	0″53	3*n*	HΣ
1888.64	216.4	0.5±	7*n*	Sp
1893.62	218.4	0.52	3*n*	Wilson
1905.69	215.4	0.58	2*n*	Doo

[β (**V**)... β (*Mon. Not.* **XXXV**, 31)... Δ (**I**)... Δ (2086)... HΣ (**XII**)... Sp (**III**)... Wilson ( )...]

10543. **Ho 280.** Probably fixed. 43 14

1896.25	76°8	13″60	2*n*	Ho	7.0...12.2

[Ho (2977, 3558)...]

(See p. 1083)

10544. **β 365.** Discovered with the 6-inch. Σ 2732 is $1^{m}\ 29^{s}$ *p* and 6′7 *s*. Perhaps a little change in distance. 43 36

1892.77	285°2	14″80	2*n*	Wilson	8.5...11.8
1898.69	286.1	14.53	1*n*	β	8.5...10.8
1902.45	283.7	14.38	3*n*	Doo	8.0...10.7

[β (**VI**)... β (2062)(*Pub. Y. O.* **I**)... Wilson ( )... Doolittle (*Pub. Flower Obsy.* **II**)...]

43m 55s **10546.** 15 *Delphini.* Taken by mistake for 16 *Delphini* (No. 10609). 15 *Delphini* has a proper motion of 0″106 in 18°6 (Auwers). No other measures. There is a 10m star, 81°3 : 108″44 (1901.51) 1*n*.

[β6... **Engelhardt (II, III)**...]

44 0 **10547.** Kr 52. Noted as double in *A. G. Hels.*

1898.35	64°5	4″76	3*n*	Doo

[β (3042)(*Pub. L. O.* II)...Doolittle (*Pub. Flower Obsy.* I)...]

44 1 **10548.** OΣ (App) 210. Some change in distance. There are many small stars in the field, one about 13″ from B.

1903.43	122°9	80″36	3*n*	β

[Δ (I)...β2...β6...]

44 10 **10549.** **H** 1577. Noted as double in *A. G. Leipzig.*

1903.71	247°4	9″32	2*n*	M	8.8... 9.3
1905.63	247.5	9.33	2*n*	β	8.8...10.6

[Miller (4022)...β6...]

44 10 **10550.** **H** 1578. The only measures are recent:

1905.63	311°7	11″58	2*n*	β6	9.6...10.6

44 13 **10551.** **H** 1580. The only measure is:

1902.68	246°8	10″70	1*n*	Es	8.9...12.0

[Espin (*Mon. Not.* **LXIV**, 679)...]

44 26 **10554.** **Espin 31.** Discovered by Espin.

[Espin (3717)(*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n* **III**, 228)...]

(See p. 1083)

44 31 **10555.** Σ 2731. (ACD = **Ho 596.**) No change in the Struve companion.

1866.89	88°4	3″98	3*n*	Δ
1879.57	86.4	4.33	1*n*	Cin
1895.80	82.6	3.92	1*n*	Ho

Hough connects two stars more distant:

AC	1895.80	171°3	16″41	1*n*	Ho	...12.5
AD	1895.80	249.0	18.53	1*n*	Ho	...13

[Ma (*F. S.* I)...Ma (XI, XIII)...Δ (II)...Cin5...Ho (3558)...]

44 44 **10556.** **H** 1579. "Elegant." The magnitude in DM is 9.4. The only measure is:

1880.67	120°2	5″27	1*n*	Big	10...11

(See p. 1083)

44 49 **10557.** β 366. (CD = Δ 23.) The pair AB and the distant companion C were discovered with the 6-inch. The latter was found to be double by Dembowski while measuring AB. Both pairs are without change. OΣ 412 is 2m 48s *p* and 11′ ***n***. All the other measures are given:

A and B

1893.55	127°5	1″24	2*n*	Lv
1893.72	129.0	1.47	2*n*	Wilson
1896.88	(152.3)	1.86	1*n*	Morgan
1898.48	128.6	1.42	3*n*	Doo
1898.69	130.5	1.21	1*n*	β

C and D (= Δ 23)

1893.55	1°2	1″35	1*n*	Lv
1898.48	6.9	1.72	3*n*	Doo
1898.69	5.0	1.41	1*n*	β

AB and CD

1893.72	106°1	50″71	1*n*	Wilson

A and C

1898.48	105°1	50″64	3*n*	Doo
1898.69	107.2	51.54	1*n*	β

[β (VI)....β (2062)(*Pub. Y. O.* I)....Δ (I)....Lv (*A. J.* 382)....Wilson (   )....
Morgan (*A. J.* 439)...Doolittle (*Pub. Flower Obsy.* I)...]

10558. 55 *Cygni.* **H 1581.** Fixed. The large star has a very small proper motion, 0″012 in 260°2 (Auwers). 44m 50s

1875.11	174°0	20″49	2*n*	Δ	5.2...11.2
1901.57	173.9	20.72	2*n*	β	6.0...10.8

[Δ (I)...Espin (3717)...β5...]

10559. 4 *Aquarii.* Σ 2729. (= ♅ I. 44 = ♅ VI. 58.) 45 4
Binary. Although the companion has passed over an arc of nearly 260° since the measures of Struve, the elements of the orbit are entirely unknown, as there is nothing in the measures to determine the maximum separation of the components in the first and fourth quadrants. The observations before Struve are too doubtful to furnish any safe data. It is not difficult to find the smallest apparent ellipse which will represent the observed positions, and this appears to have been adopted by the computers, but nothing in this regard can be safely assumed until the companion has been measured in a position-angle of nearly 360°. Many of the best of the early measures are more or less uncertain in angle as well as distance. The system has a proper motion of 0″064 in 88°2 (Auwers).

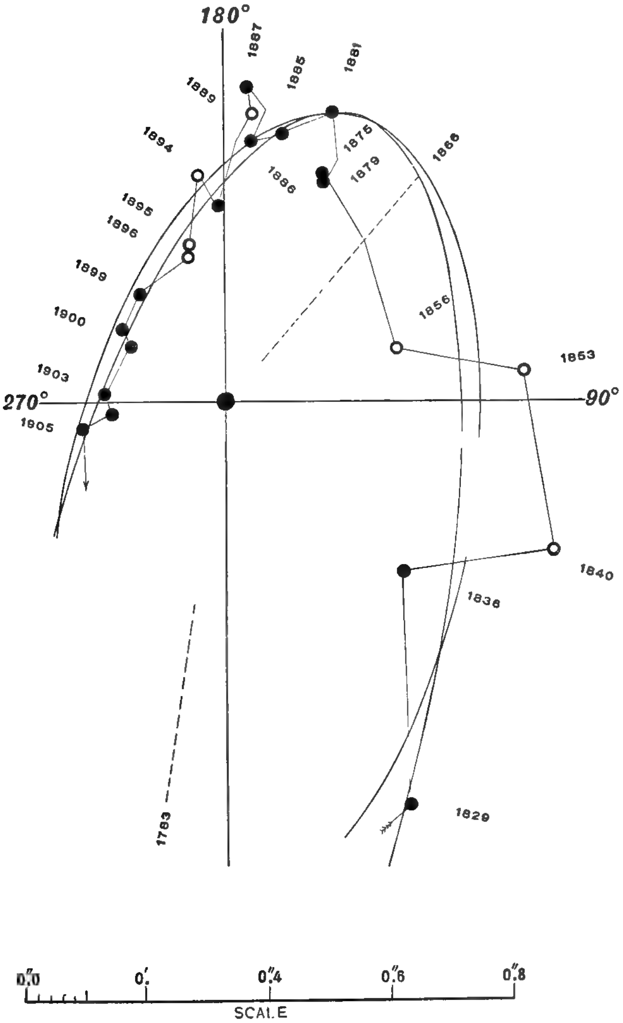
Three orbits have been published:

1877	Doberck	129.84 yrs.	*A. N.* 2287
1894	See	126.65	*A. J.* 341
1895	See	129.0	*Evolution of the Stellar Systems*

The following selected positions by leading observers are shown on the diagram:

1783.36	351°5	....	1*n*	♅
1829.76	24.5	0″74	5*n*	Σ
1836.05	46.3	0.41	3*n*	Σ
1840.72	65.5	0.6±	2*n*	Da
1853.70	95.9	0.5±	1*n*	Da
1856.81	107.8	0.3±	1*n*	Se
1866.08	139.6	Cun	3*n*	Δ
1875.62	157.0	0.42	2*n*	Sp
1879.76	155.9	0.40	4*n*	Hl
1881.54	159.6	0.52	3*n*	β
1885.74	167.9	0.46	3*n*	Hl

1886.84	174°8	0″47	2*n*	Hl
1887.28	173.5	0.41	7*n*	Sp
1887.79	175.9	0.53	3*n*	Hl
1888.81	172.4	0.48±	5*n*	Sp
1889.88	176.7	0.49±	2*n*	Sp
1893.31	182.0	0.33	1*n*	Com
1894.86	186.5	0.38±	3*n*	Sp
1895.53	192.8	0.27	7*n*	Barnard
1895.76	193.9	0.25±	4*n*	Com
1895.81	191.8	0.20	1*n*	Lewis



4 Aquarii. Σ 2729.

1896.67	194°1	0″25±	2*n*	Com
1899.53	218.3	0.23	3*n*	A
1900.70	234.9	0.21	5*n*	A
1901.51	240.1	0.18	4*n*	A
1903.59	266.8	0.20	2*n*	A
1904.62	276.6	0.19	2*n*	A
1905.52	281.4	0.24	2*n*	A

The two ellipses, portions of which are shown on the diagram, represent the observed position equally well, and with errors much smaller than the most careful and experienced observer would concede in his measures of a star of this class. The periods of these orbits differ by at least sixty years.

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XV**)...H (236)...H 2... Bp... Da 3... Se... Se 2...Se 8...Se (*Comp. Rend.* **XLVIII**, 375)...Hd...Ba (**II**)...Newcomb (*Wash. Obsns.* 1867)... Δ (1736)... Δ (**II**)...WS 2... Sk 3...Flm...Pt...Cin 4...Cin 5...LM... Do (2287, 2433)... T (2899, 3185)... β 2... β 4... Hl (*Wash. Obsns.* 1885–86)...Hl (**I, II**)...Sp (2133)...Sp (**I, II, II** App., **III**)...Sk 4...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LX**, 513; **LXII**, 383).... Everett (*Mon. Not.* **LVI**, 464)...Com (**X**)...Sk 5...Barnard (*A. J.* 447)... See (3496) (*A. J.* 341, 359, 378) (*Evolution of the Stellar Systems*).... Solá (3497).... A (3639) (*Bul. L. O.* No. 11)... Biesbroeck...]

(See p. 1083)

10560. **Σ 2732.** (= **H** II. 100 = **S** 767.) Probably fixed. 45^{m} 5^{s}

1868.91	74°0	3″89	4*n*	Δ
1895.66	74.3	4.12	2*n*	Gla
1902.57	74.5	4.34	1*n*	Hu

[Ma (**XI**)...Ma (*F. S.* **I**)...Se...Δ (**II**)...Glasenapp (**IV**)...]

10561. **See 431.** (= **See 432.**) Both places in error. 45 6
Identified by Cogshall as given in Part I.

1897.77	(324°1)	2″27	1*n*	See	8.2...13.3
1899.67	342.9	2.08	4*n*	Cg	8.5...13.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10562. **Σ 2730.** (= **S** 766.) No motion. 45 8

1866.34	335°8	3″29	3*n*	Δ
1877.57	335.7	3.49	4*n*	Sp
1902.66	335.3	3.56	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H 1...Bp...Da 3... Ra (**XXIII**)...Se...Se 3... Ba (**II, III**)...WS 2... Δ (1209)... Δ (**I, II**)...Sp (**II**)... T (2991)... Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

10563. **H 1582.** The nearer companion was first noted by Espin. 45 12

A and B

1905.68	47°2	17″13	1*n*	β 6	8.6...13.0
1905.89	45.0	17.13	2*n*	Es	7.8..13.0

A and C

1905.68	326°9	28″40	1*n*	β 6	...10.7
1905.92	327.4	27.22	3*n*	Es	...11.0

[Espin (*Mon. Not.* **LXVI**, 143)...]

10564. **H 3001.** The only later observation is: 45 15

1901.55	240°8	6″74	5*n*	Doo	8.8...9.6

[Doolittle (*Pub. Flower Obsy.* **II**)...]

10565. **OΣ 415.** Unchanged. 45 37

1868.86	237°6	3″43	5*n*	Δ
1882.65	237.2	3.55	3*n*	Ho
1898.51	235.6	3.42	3*n*	Hu

[Ma (**XI**)....OΣ (**IX**)....Da 3.... Δ (**I**).... Ho (2978)....Glasenapp (**III, V**)....Hu (*Pub. L. O.* **V**)...]

45^m 37^s **10566.** **β 67.** Discovered with the 6-inch. OΣ 415 is 30′ *s*. No motion.

1876.70	289°4	1″84	1*n*	OΣ	7.0...10.0
1885.38	283.6	1.73	4*n*	HΣ	
1892.67	291.2	1.68	1*n*	Wilson	
1897.79	288.1	1.62	1*n*	Brown	
1898.58	286.9	1.36	3*n*	Doo	7.0... 9.3

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...Δ (I)...OΣ (X)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* I)...HΣ (XII)...Brown (3646)...]

45 51 **10569.** **β 250.** Discovered with the 6-inch. Probably fixed.

1876.70	5°2	20″04	1*n*	OΣ	6.5...11.5
1885.55	6.9	19.92	1*n*	HΣ	
1892.86	7.4	19.43	2*n*	Wilson	7.2...12.0
1898.46	6.6	19.58	3*n*	Doo	7.2...10.0

[β (V)...β (*Mon. Not.* **XXXV**, 31)...Δ (I)... OΣ (X)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* I)...HΣ (XII)...]

45 59 **10572.** **H 3003.** Probably fixed.

1877.67	216°6	2″15	5*n*	Cin	6.2...8.2
1883.72	218.5	1.84	2*n*	Ho	7 ...9
1905.75	216.4	2.46	6*n*	Doo	6.7...8.5

The proper motion is given, 0″108 in 116°3 (Hedrick).

[Cin^3...Cin^4... Cin^5... LM ... Ho (2978) ... Glasenapp (I) ... See (3496)... Scott (*Mon. Not.* **LIX**, 427)...]

46 · **10573.** **H. C. Wilson 21.** From Wilson (Cin^{10}). Since Part I was in type, Doolittle has identified this as Cord. DM (23°) 16554, the place of which is:

R. A. = 20^h 45^m 40^s }
Decl. = − 23° 49′9 }

1905.72	18°7	30″69	4*n*	Doo	8.8...9.4

46 6 **10574.** **β 154.** Discovered with the 6-inch. Evidently fixed. The larger star is given a proper motion of 0″065 in 163°2 (Kustner).

1878.91	60°2	2″93	4*n*	Cin
1886.77	60.9	2.87	3*n*	LM
1898.62	59.6	2.88	3*n*	Doo

[β (III)... β (*Mon. Not.* **XXXIV**, 59)... Cin^4... Cin^5... Cin^6... LM... Lv^1... Glasenapp (I)...Doolittle (*Pub. Flower Obsy.* I)...]

46 15 **10575.** **H 3004.** "A remarkably pretty, delicate object." In the field *p* the 8m star, DM (61°) 2057. The only measure is:

1901.64	197°7	3″81	2*n*	β^5	10.9...10.9

46 24 **10577.** **OΣ (App) 211.** This has a proper motion of 0″168 in 57°6 (*Greenwich 10-Year Catalogue*). The measures of Δ and β give, 0″172 in 64°1. B is Rad^1. 4985.

1882.95	261°8	114″02	4*n*	Franz
1905.67	262.5	110.31	3*n*	β

[Δ (I)...Franz (2649)...β^6...]

10578. **Hn 42.** Probably no motion. 46^m 32^s

1888.37	223°9	0″97	3*n*	Com	9.3...9.3
1900.57	228.2	1.24	1*n*	Hu	9.5...9.5

[β^4...Com (VI)...Hu (*Bul. L. O.* No. 44)...]

10579. **Hn 43.** No change. 46 48

1888.09	5°0	1″98	3*n*	Com

[β^4...Com (VI)...]

10580. **Σ 2733.** (= **S** 768.) Fixed. 46 48

1866.27	144°8	40″40	3*n*	Δ
1892.81	145.0	40.31	2*n*	Gla
1902.66	144.4	40.14	2*n*	Hu

[Ma (*F. S.* II) ... Ma (XIII) ... Ra (XXI) ... Δ (II) ... Cin^6 ... Glasenapp (II) ... *Annals Toulouse Obsy.* III...]

10581. **Ho 144.** The later measures show no sensible change. 46 56

1888.71	165°0	0″48	1*n*	Lv
1888.79	165.9	0.41	4*n*	T
1890.72	169.3	0.37	1*n*	Ho
1896.22	166.7	....	2*n*	Ho
1905.70	171.2	0.40	4*n*	Doo

[Ho (2779, 3234, 3558)...Lv^1...T (2991)...Do (3681)...]

10585. **Arg. 40.** "Duplex" in O. Arg. N. Found and estimated, 260°: 12″: 9...10 (1875). Recently measured: 47 11

1900.75	251°3	9″48	1*n*	Es	8.8...9.1
1902.03	251.5	9.22	2*n*	β	9.1...9.3

[Espin (*Mon. Not.* **LXIV**, 680)...β^6...]

10587. **Ho 145.** The later measures indicate some change in angle and distance. 47 24

1895.69	315°1	8″07	2*n*	Ho
1902.42	312.8	8.51	4*n*	Doo

[Ho (2779, 3558)...]

10588. **β 155.** Discovered with the 6-inch. No material change. This star was observed by Ball for parallax. The comparison star is 198″ distant in the direction of 48°4 (*Dunsink Obsns.* V). All the other measures are given: 47 24

A and B

1884.60	23°5	0″70	2*n*	HΣ
1884.90	24.2	0.39	5*n*	En
1888.93	26.6	0.58	2*n*	Sp
1897.90	28.3	0.75	1*n*	Brown
1898.46	27.3	0.76	3*n*	Doo

AB and C

1905.79	26°1	16″97	2*n*	β

[β (III)...β (*Mon. Not.* **XXXIV**, 59)...Δ (I)...Δ (2086)...En (2786)..Sp (III)... Doolittle (*Pub. Flower Obsy.* I)...HΣ (XII)...Brown (3646)...β^6...]

47m 28s **10589.** **H 1586.** Without change.

1876.76	262°0	15″09	2*n*	OΣ	7.8...10.8
1885.61	262.9	15.26	2*n*	HΣ	
1904.71	260.9	15.62	2*n*	Espin	

[OΣ (**X**)...HΣ (**XII**)...Espin (*Mon. Not.* **LXVI**, 143)...]

47 42 **10590.** **OΣ 416.** Slow change in angle and distance, apparently from proper motion.

1846.13	146°7	6″97	3*n*	OΣ
1863.26	142.4	7.17	2*n*	OΣ
1867.75	141.0	7.03	4*n*	Δ
1869.80	141.3	6.99	3*n*	Du
1876.85	141.9	7.14	1*n*	OΣ
1883.93	137.9	7.23	6*n*	En
1889.27	136.0	7.46	2*n*	HΣ
1897.61	134.9	7.58	6*n*	Hu
1901.59	134.4	7.66	3*n*	Doo

[Ma (**XI, XIII**)...Da^3...Du...OΣ (**IX, X**)...WS^2...Sk...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Δ (**I**)...En (2678)...Sk^4...Glasenapp (**V**)...HΣ (**XII**)...Hu (*A. J.* 397)(*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

48 0 **10591.** **OΣ 417.** No change in either companion since 1847. Otto Struve's observed position-angle of the close pair in that year was 30°2, which was certainly much better than his corrected value of 39°4, and this is the case generally where the changes are of any practical importance.

A and B

1847.98	39°4	0″57	5*n*	OΣ
1873.67	29.1	0.70	6*n*	Δ
1883.71	33.1	0.74	2*n*	Per
1887.16	32.8	0.51	2*n*	HΣ
1894.62	31.5	0.7±	4*n*	Gla
1897.79	29.5	0.71	1*n*	Brown
1898.51	31.4	0.66	3*n*	Hu
1900.54	29.2	0.68	3*n*	Doo

AB and C

1867.77	109°2	30″82	4*n*	Δ
1898.51	108.3	30.90	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Flm...Sk^2...Per...Per (2560)...En (2678)...Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)...Do (3466, 3681)...Brown (3646)....Solá (3679)....Hu (*Pub. L. O.* **V**)....Doolittle(*Pub. Flower Obsy.* **I**)....HΣ (**XII**)...]

48 2 **10592.** **Arg. 41.** "Duplex" in O. Arg. N. Other companions more distant.

AB	1902.73	181°1	9″47	2*n*	Es	8.8... 8.7
BC	1902.73	250.5	13.04	2*n*	Es	...12.5

[β^5...Espin (*Mon. Not.* **LXIV**, 680)...]

48 6 **10593.** **H 3005.** "A very red." Only reddish at most with the 40-inch.

1905.53	297°2	30″74	1*n*	β^6	8.5...11.0

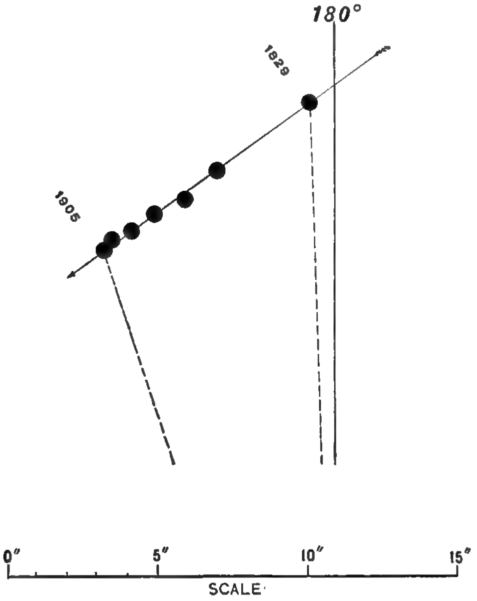
48 12 **10594.** **Ho 597.** The only later position is:

1904.71	218°8	9″82	3*n*	Doo

[Ho (3558)...]

10595. **Σ 2734.** Change from proper motion. The measures give 0″111 in 125°2 for the movement of A, assuming B to be stationary. The meridian positions give a smaller value but this is uncertain from insufficient data. 48m 21s

1829.79	181°7	28″50	3*n*	Σ
1864.81	188.6	26.49	6*n*	Δ
1878.61	191.2	25.82	3*n*	β
1887.13	193.7	25.51	2*n*	HΣ
1897.64	195.8	25.16	2*n*	Gla
1902.66	197.3	25.03	2*n*	Hu
1905.63	198.2	24.85	2*n*	β



Σ 2734.

[Δ (1475)....Δ (**II**)....Flm....WS^2....Sk....T (2991)....β^1....Glasenapp (**V**)....*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk^6...Furner and Storey (*Mon. Not.* **LXIV**, 448)...β^6...]

10597. **OΣ (App) 212.** No sensible change. 48 33

1905.71	154°0	65″59	2*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

10598. **Ho 146.** The only later measures are: 48 49

1895.70	58°3	0″24	1*n*	Ho
1905.77	67.7	0.30	4*n*	Doo

[Ho (2779, 3558)...]

10601. **Lv 8.** Discovered by Leavenworth at the McCormick Observatory. Probably fixed. 49 7

1896.58	291°8	1″21	2*n*	Lv	
1899.66	300.1	1.24	3*n*	Hu	9.2...9.8

[LM....O. Stone (*A. J.* 156)....Lv (*A. J.* 278, 407)(*Proc. Haverford Coll. Obsy.* 1892)...Hu (*Bul. L. O.* No. 44)...]

$49^m\ 28^s$ **10602.** **Hu 762.** With another measure the mean is:

1904.49	152°3	1″77	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

49 31 **10603.** **H 5514.** Not found by Glasenapp in 1892, and not certainly identified with the 40-inch in 1901.

[Glasenapp (**II**)...β^5...]

49 40 **10605.** **Σ 2735.** (= **H I. 61.**) Fixed.

1867.45	287°5	1″97	4*n*	Δ
1887.63	288.6	2.08	2*n*	T
1892.70	284.1	2.02	1*n*	Gla
1898.77	285.4	1.92	3*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**IX, X, XV**)...H (**V**)...H^1...Mh...Bp...Da^2...Hd...Se....Se^3....Ra (**XXIV**)....Ba (**II**)....Δ (*Mem. Accad. Sci.*)....Δ (**I, II**)....Δ (1032, 1117)...WS...Gl...Kn...Pt...T (2899)... Maw (**I**)...Collins (*Proc. Haverford Coll. Obsy.* 1891)....Glasenapp (**II**)....UL....*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...Lohse (*Pub. Potsdam Obsy.*)...]

49 53 **10606.** **OΣ 420.** Relatively fixed.

1868.93	4°6	5″56	4*n*	Δ
1898.57	2.1	5.78	3*n*	Hu
1901.57	0.6	5.90	2*n*	Doo

[Ma (**XI**)...OΣ (**IX, X**)...Δ (**I**)...Big...En (2678)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

49 54 **10607.** **β 367.** Discovered with the 6-inch. There is rapid angular motion in the close pair. In the field with 32 *Vulpeculae*. The proper motion of this star from Bossert is 0″160 in the direction of 138°5. C is fixed in space with reference to the binary AB.

All the measures of the close pair are given:

A and B

1876.37	115°7	0″55	4*n*	Δ
1882.68	105.0	0.45	1*n*	Perry
1883.66	139.7	0.35	6*n*	En
1891.68	129.8	0.44	3*n*	β
1897.74	135.6	0.55	3*n*	Do
1897.83	137.1	0.42	1*n*	Brown
1899.51	136.1	0.42	3*n*	A
1899.68	128.2	0.46	2*n*	Bowyer
1899.73	133.2	0.45	4*n*	Lewis
1901.77	133.3	0.40	1*n*	Lewis
1901.79	140.3	0.52	3*n*	Doo
1905.51	151.8	0.36	1*n*	Doo

AB and C

1875.60	28°2	30″88	1*n*	Δ
1891.68	24.0	31.50	3*n*	β
1899.50	22.8	31.82	2*n*	A
1901.79	21.6	32.14	2*n*	Doo

The measures of C give 0″140 in 133°8 for the proper motion of AB.

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Δ (**I**)...Perry (*Eng. Mech.* **XXXVI**, 65)....En (2742)....Do (3466)....Brown (3646)....A (3639)....Bowyer and Lewis (*Mon. Not.* **LX**, 513; **LXII**, 383)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

10608. **OΣ 418.** There may be some increase in the distance, but the angle appears to be unchanged. $49^m\ 55^s$

1842.67	301°8	0″56	2*n*	OΣ
1843.56	281.9	0.46	2*n*	Ma
1848.81	292.8	0.67	2*n*	OΣ
1853.20	287.9	0.74	2*n*	OΣ
1868.77	293.0	0.96	1*n*	OΣ
1870.50	291.5	0.97	6*n*	Δ
1882.73	290.7	1.02	5*n*	Hl
1888.40	290.9	0.94	7*n*	Sp
1894.73	291.2	1.14	2*n*	Gla
1898.51	289.7	1.06	3*n*	Hu
1899.20	290.4	1.24	6*n*	Do

[Ma (**XI**)... Da^3... Se... Flm... OΣ (**IX, X**)...Sk...Δ (**I**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2330, 3023, 3466, 3681)...β^1...Perry (*Eng. Mech.* **XXXVI**, 65)... Newcomb (*Wash. Obsns.* 1874)... Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)...Per...Per (2560)...En (2742)...Glasenapp (**III**)... Sp (**III**)... Big (*Bul. Ast.* **XII**, 299)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Sk^5...]

10609. 16 *Delphini.* **H 1592.** "A third *p.*" The principal star has a proper motion of 0″024 in 65°6 (Auwers). The only observations since H are the following: 49 55

1879.50	21°8	39″97	2*n*	β^3	...12.0
1902.95	21.4	38.82	5*n*	β^6	...12.2

10610. **OΣ 419.** No sensible change. 50 1

1867.27	37°6	1″62	4*n*	Δ
1877.76	38.0	1.65	1*n*	β
1898.54	34.4	1.78	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...β^1...Brown (3646)...Hu (*Pub. L. O.* **V**)...]

10611. **See 433.** A later position is: 50 14

1898.74	42°0	2″57	3*n*	Cogshall

[See (*A. J.* 431)... Cogshall (*A. J.* 486)...]

10612. **H 927.** The only measures are: 50 15

1892.69	347°9	30″03	2*n*	Gla	8.8...8.9

[Glasenapp (**II**)...]

10614. **See 434.** A later position is: 50 22

1898.68	151°7	4″19	2*n*	Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...]

10616. 7 *Aquarii.* **β 1034.** Discovered with the 36-inch. The principal star has a proper motion of 0″033 in the direction of 257°8 (Auwers). It is very probable that this is a physical system. These are all the other measures: 50 25

1897.72	163°7	2″05	3*n*	A
1901.59	166.2	2.14	3*n*	Doo

[β (**XIV**)....β (2875)(*Pub. L. O.* **II**)....A (*A. J.* 429)....Doolittle (*Pub. Flower Obsy.* **II**)...]

50^m 33^s **10617.** **OΣ 422.** Relatively fixed.

1867.43	334°9	2″60	4*n*	Δ
1898.54	335.1	2.67	3*n*	Hu
1899.72	333.8	2.75	6*n*	Doo

[OΣ (**IX**)...Δ (**I**)...Sk^2... Doolittle (*Pub. Flower Obsy.* **I, II**)... Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

50 47 **10618.** **A 751.** With two other measures (*Bul. L. O.* No. 61) the mean is:

1904.53	33°9	0″16	3*n*	A	6.8...7.3

50 54 **10620.** **OΣ 423.** Without change.

1867.26	79°6	2″64	4*n*	Δ
1881.97	79.8	2.80	6*n*	Hl
1898.54	79.2	2.86	3*n*	Hu

[OΣ (**IX**)....Da^3....Δ (**I**)....Hl (*Wash. Obsns.* 1884)....Hl (**I, II**)....Hu (*Pub. L. O.* **V**)...]

50 54 **10621.** **Ho 460.** Hough mentions a 13 m star, 262°2:37″41.

1905.70	87°4	12″50	2*n*	β

[Ho (3234)...β^6...]

50 55 **10622.** **OΣ 421** *rej.* Rejected in second edition of *Poulkowa Catalogue.* Unchanged.

1898.57	192°9	36″86	3*n*	Hu
1901.53	192.6	36.73	1*n*	β

Hussey measures a 12.5 m star:

1898.58	77°5	30″57	2*n*	Hu

[Ma (**XI**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^5...]

51 1 **10623.** **Σ 2736.** Fixed.

1865.47	220°8	5″08	3*n*	Δ
1894.60	220.9	5.07	2*n*	Gla
1902.66	219.7	5.18	2*n*	Hu

[Ma (*F. S.* **I, II**)...Ma (**X, XIII**)...H^1...Se...Wr...WS^2...Δ (**II**)...T (2991)... Glasenapp (**III**)...*A. G. Leipzig,* p. 211...*Annals Toulouse Obsy.* **III**...Lohse (*Pub. Potsdam Obsy.*)...]

51 1 **10624.** **H 1593.** "It can scarcely be Σ 2736, yet the places agree nearly." I could not find any other than Σ 2736 (1875).

51 1 **10625.** **H 1596.** Nothing since H but this:

1904.68	295°5	16″86	3*n*	Espin	8.9...11.2

[Espin (*Mon. Not.* **LXVI**, 143)...]

51 2 **10626.** **Howe 55.** The principal star has some proper motion, and the recent measure indicates that the companion is moving with it.

Bossert	0″109 in 204°2
Paris	0.119 in 180
A. G. Nico.	0.075 in 180

1901.53	71°8	26″27	2*n*	β	6.8...11.0

[Cin^5...β^5...]

10627. Noted "double, comp. *f*" in *Harvard Zones.* Measures from Cin^5. The 40-inch shows a nearer star: 51 21

AB	1901.53	334°9	11″40	2*n*	β^5	8.8...12.7
AC	1901.53	138.6	41.31	2*n*	β^5	... 9.0

10628. **Espin 95.** (AC = **H 1597.**) The nearest companion detected by Espin. 51 27

AB	1905.78	279°7	5″99	1*n*	β	10...11
AC	1905.78	128.7	12.10	1*n*	β	...11

[Espin (3784)...β^6...]

10630. **A 175.** No other measures. 51 42

[A (3741)(*Bul. L. O.* No. 3)...]

10631. **A 752.** With later measures (*Bul. L. O.* No. 61) the mean is: 52 4

1904.49	17°9	1″02	3*n*	A	9.0...9.8

10632. **A. G. 268.** Double in *A. G. Albany.* Measures by Miller (*A. J.* 554). 52 12

10633. **Barnard 13.** Near ε *Equulei.* Discovered by Barnard with the 12-inch at Mt. Hamilton. The magnitude in DM is 9.0. No motion. 52 14

1891.82	84°2	1″31	1*n*	Barnard
1899.79	86.2	1.44	1*n*	Bryant

[β (3114)(*Pub. L. O.* **II**)... Barnard (*A. J.* 447)... Bryant (*Mon. Not.* **LX**, 513)...]

10634. **β 764.** Discovered with the 6-inch. The close pair is the *p* star of a small triangle. The other stars of the triangle, C and D, are SD (9°) 5632 and 5635. 52 22

The following are all the later measures:

		A and B		
1886.79	353°2	0″64	2*n*	LM
1893.75	353.8	0.79	3*n*	Wilson
1898.75	359.0	0.86	3*n*	Bd
		AB and C		
1893.71	112°3	99″64	3*n*	Wilson
1898.75	112.0	100.34	3*n*	Bd
		AB and D		
1893.71	21°5	137″17	3*n*	Wilson
1898.75	21.6	137.80	3*n*	Bd

A 11.5 m star has been measured from AB:

1893.71	90°5	58″20	3*n*	Wilson
1898.75	89.7	59.08	3*n*	Bd

[β (**XI**)...β^2...β^3...LM...Wilson ( )...Boothroyd (*A. J.* 478)...]

10636. **Hu 763.** No other measures. 52 27

[Hu (*Bul. L. O.* No. 65)...]

10637. **H 1599.** Nothing later but the following: 52 28

1905.68	222°0	15″14	1*n*	β^6	9.6...11.0

52m 37s **10639.** β 1137. Discovered with the 36-inch. This is a naked-eye star in *Cygnus;* Harvard photometric magnitude 5.9. The proper motion in *A. G. Harvard* is, 0″.068 in 114°.2. The other measures are:

1898.31	346°.1	6″.94	2*n*	β	7.0...13.2
1898.72	343.9	7.20	3*n*	A	6.0...14.3

[β (**XVI**)....β (2956)(*Pub. L. O.* **II**)...A (3585)...]

52 57 **10640.** Σ 2738. (= S 769.) No material change. Glasenapp measures a distant 7.9m star, 103°.1 : 212″.09 (1889.67) 1*n*.

1865.67	254°.5	14″.80	3*n*	Δ
1891.70	254.8	14.71	4*n*	Gla
1902.72	254.3	15.22	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XV**)...H1...Da2...Ra (**XXIII**)...Δ (1209)...Δ (**I, II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Lau (4078)...]

52 59 **10641.** A 754. With other measures (*Bul. L. O.* No. 61) the mean is:

1904.53	16°.2	0″.77	3*n*	A

53 0 **10642.** Ho 598. A later measure shows a decided increase in distance.

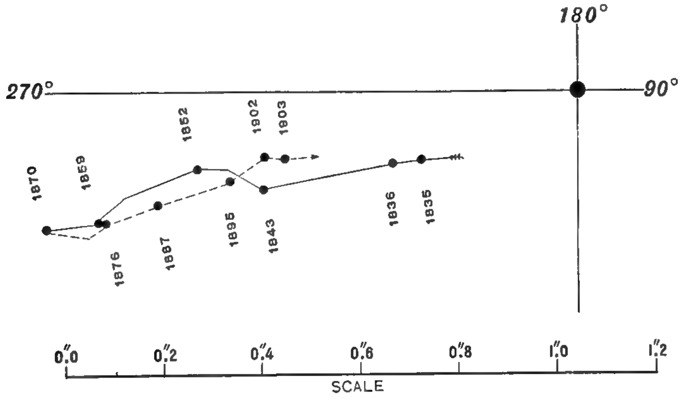
1904.48	111°.5	18″.10	3*n*	Doo

[Ho (3558)...]

53 5 **10643.** ε *Equulei.* Σ 2737. (AC = H III. 21 = Sh 328.) A triple physical system. The components have a common proper motion:

Stumpe	0″.202 in 227°.7
Boss	0.226 in 226.3
Auwers	0.204 in 227.1

The plane of the orbit of AB is in the line of sight, and therefore the change is in distance only. The maximum separation seems to have been reached, and B is now returning to its position at the time of the first measures by Struve. The period will necessarily remain wholly unknown until the companion is at its greatest distance in the first or second quadrant.



ϵ Equulei..Σ 2737.

The following selected positions, at short intervals of time, are shown on the diagram:

A and B

1835.67	294°.0	0″.35	4*n*	Σ
1836.71	291.6	0.41	4*n*	Σ
1843.64	287.5	0.68	2*n*	OΣ
1852.26	281.7	0.80	2*n*	OΣ
1859.63	285.4	1.02	3*n*	OΣ
1870.32	283.8	1.15	2*n*	OΣ
1870.63	285.4	1.10	5*n*	Δ
1876.33	286.1	0.97	6*n*	Sp
1879.70	285.0	1.05	2*n*	Hl
1886.22	284.7	0.88	4*n*	Hl
1887.54	285.5	0.84	3*n*	Sp
1888.81	285.7	0.97	9*n*	HΣ
1895.27	284.8	0.71	8*n*	Com
1895.73	284.4	0.77	2*n*	Lewis
1902.48	282.0	0.66	8*n*	Bryant
1903.65	283.3	0.62	2*n*	Biesbroeck

There is no material change in the distant companion.

AB and C

1864.80	76°.0	10″.88	7*n*	Δ
1875.90	75.3	10.69	4*n*	Sp
1886.21	75.0	10.88	4*n*	Hl
1889.24	72.7	10.65	6*n*	HΣ
1903.65	72.8	10.61	2*n*	Biesbroeck

[Ma (*F. S.* **I**, 39, 198)...Ma (324)...Ma (**IX, X, XI, XII, XIII, XV**)... H (**V, VII**)...Mh...K...Bp...Da3...Da4...Auwers (1393)...P1...WJ2...Se...Se2...Se3.... Se (1017, 1614).... Ra (**XXVII-XXX, XXXII-XXXVI, XXXVIII**)....Ba (**II, IV**)...Hd...Du...Flm...OΣ (**IX**)...Δ (*Mem. Accad. Sci.*)...Δ (1032, 1117, 1195, 1475)...Δ (**I,II**)...WS...WS2...Gl...Kn...Sk...Perry (*Eng. Mech.* **XXXVI**, 65; **XXXIX**, 11)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 2242, 3466, 3681)...Giacomelli (**III**)...Pt...Newcomb (*Wash. Obsns.* 1874)...Sp (2133)...Sp (**II, II** App.)...Per...Per (2559)...Je (2407, 2772, 3802)...T (2899)...En (2678)...Knorre, etc., (*Beob. Berlin*, No. 6, 1892)...Hl (*Wash. Obsns.* 1885–86)...Hl (**I, II**)...*Proc. Haverford Coll. Obsy.* 1891...Engelhardt (**I**)...Glasenapp (**I**)...Maw (**I, IV**)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Com (**X**)...Knorre (3300)...Coleman (*Mem. R. A. S.* **LIII**)...Solá (2497, 3679)....Gl (*Mon. Not.* **LXI**, 556)....*Annals Toulouse Obsy.* **III**....HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXII**, 383; **LXIII**, 403; **LXIV**, 804)...Sk5...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

10646. β 765. Discovered with the 6-inch at Mt. Hamilton in 1879. In *Cord. G. C.* 7.1m. The later measures are given: 53m 9s

1891.76	126°.4	2″±	1*n*	Sellors
1898.68	130.3	1.86	3*n*	A
1898.73	140.7	2.32	1*n*	Bd

[β (**XI**)...β2...β (3114)(*Pub. L. O.* **I, II**)...Sellors (3154)...A (3585)...Boothroyd (*A. J.* 478)...]

10648. H 928. Nothing since H but this: 53 25

1879.63	85°.8	12″.04	1*n*	Cin	9.0...12.0

[H (V)...Cin5...] (See p. 1083)

10649. A 755. With other measures (*Bul. L. O.* No. 61) the mean is: 53 28

1904.52	358°.8	0″.16	3*n*	A	8.5...8.6

53m 39s **10650.** **OΣ 424.** It is always a difficult pair, and has been frequently recorded as single, but the best observations, taken together, show no change.

1845.66	324°.8	0″.25	1*n*	Ma
1846.19	328.7	0.46	2*n*	OΣ
1851.71	326.3	0.2±	1*n*	Ma
1852.64	318.9	0.36	1*n*	OΣ
1878.93	327.0	0.41	3*n*	β
1887.37	321.3	0.48±	3*n*	HΣ
1891.83	324.8	0.44	2*n*	β
1898.61	325.0	0.46	3*n*	Hu
1900.47	321.1	0.44	5*n*	Bryant
1902.66	325.3	0.43	2*n*	Hu

No other complete measure of the distant star.

[Ma (**XI, XIII**)....OΣ (**IX**)....Δ (**I**, p. 230)....Flm....Sk^2....β^1....β^3....β (3114) (*Pub. L. O.* **II**)...Greenwich Obsy. (*Mon. Not.* **LX**, 513; **LXII**, 383; **LXIII**, 403) ...Hu (*Pub. L. O.* **V**)(*Bul. L. O.* No. 40)...HΣ (**XII**)...Sp (**III**)...]

53 49 **10651.** **Hn 165.** The only other measure is this:

1900.57	163°.2	3″.52	1*n*	Hu	9.0...12.5

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...Hu (*Bul. L. O.* No. 44)...]

53 58 **10652.** **Ho 461.** The only later observation is:

1905.74	227°.4	2″.27	3*n*	Doo

[Ho (3234)...]

54 13 **10653.** **Σ 2740.** Fixed.

1869.65	330°.2	4″.29	5*n*	Δ
1905.69	330.5	4.35	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV, V**)...Δ (**II**)...β^6...]

54 15 **10654.** **OΣ (App) 213.** Unchanged.

1905.66	36°.9	70″.64	2*n*	β

[Δ (**I**)...Franz (3464)...β^6...]

54 20 **10655.** **Σ 2739.** Fixed.

1865.92	252°.8	3″.17	3*n*	Δ
1882.14	252.6	3.17	1*n*	Ho
1904.78	254.0	3.05	3*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Du...Δ (**II**)...Ho (2978)...Glasenapp (**III**)... Knorre (3632)...Bryant and Bowyer (*Mon. Not.* **LXIV**, 804; **LXVI**, 30)...]

54 20 **10656.** **β 678.** Discovered with the 18½-inch. The measures show motion in angle. The principal star is given a proper motion of 0″.239 in 82°.8 (Paris).

1878.78	185°.9	2″.45	1*n*	β
1879.64	189.7	2.37	2*n*	Cin
1886.80	192.6	....	1*n*	LM
1893.77	202.5	2.43	3*n*	Wilson
1897.84	201.4	2.49	1*n*	Brown
1898.68	197.8	2.37	4*n*	Doo
1898.82	200.0	2.55	2*n*	A

[β (**X**)...β^1...Cin^5...LM...Wilson ( )...Brown (3646)...A (3585)...Doolittle (*Pub. Flower Obsy.* **I**)...]

10657. **A 757.** With later measures (*Bul. L. O.* No. 61) the mean is: 54m 37s

1904.44	102°.5	4″.02	3*n*	A	8.8...14.7

10658. **Hu 764.** No other measures. 54 38

[Hu (*Bul. L. O.* No. 65)...]

10659. **Σ 2741.** (= H I. 97 = S 770.) No material change. 54 39

1868.78	32°.1	1″.77	4*n*	Δ
1883.22	32.8	1.87	4*n*	Hl
1896.63	31.2	1.86	4*n*	Hu
1900.53	29.2	1.94	4*n*	Doo

[Ma (*F. S.* **I**)...Ma (**IX, XI, XIII**)...H^1...H^2...H (**IV**)...Bp...Da^1...Da^2... Da^3...Wr...Se...Ferr...Ra (**XXII**)...Ba (**II, IV**)...Flm...OΣ (**IX**)...Δ (1117) ...Δ (**I, II**)...En (1674)...Du...Pl...Bl (**V**)...Perry (*Eng. Mech.* **XXXVI**, 65)... Do (2199, 3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...WS...WS^2...Gl... Sk^2...Je (2449)...Hl (*Wash. Obsns.* 1886)...Hl (**I, II**)...Maw (**I**)...Glasenapp (**III**)...Big...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Hu (*A. J.* 397)....Knorre (3518)....Coleman (*Mem. R. A. S.* **LIII**)....Doolittle (*Pub. Flower Obsy.* **I**)...Thiele (3837)...Sk^5...]

10660. **A 756.** With later measures (*Bul. L. O.* No. 61) the mean is: 54 41

1904.53	221°.1	0″.44	3*n*	A	7.4...8.3

10661. **H 3006.** "A violent suspicion, which higher powers increase." The distance was much underestimated by H. The measures show no motion. 54 51

1878.17	291°.0	1″.81	2*n*	β^1	10 ...10
1901.17	292.0	1.66	3*n*	β^5	9.7... 9.7

10663. From β^3. Both stars in DM. Nothing since but the following: 54 58

1901.66	333°.4	45″.68	3*n*	β^5	6.0...8.8

10664. **Σ 3133.** (= H 1602). Fixed. 54 59

1868.40	101°.7	3″.59	4*n*	Δ
1895.66	102.0	3.59	2*n*	Gla
1905.64	102.0	3.55	2*n*	β

[Ma (**XI**)...Δ (**II**)...Glasenapp (**IV**)...β^6...]

10666. **A 176.** No other measures. 55 23

[A (3741)(*Bul. L. O.* No. 3)...]

10667. **Ho 147.** Without change. 55 30

AB	1897.02	353°.2	7″.16	3*n*	Ho	7.0...12.7
AC	1897.15	249.3	26.08	2*n*	Ho	...12

[Ho (2779, 3558)...]

55m 34s **10668.** **β 1329.** Close pair discovered with the 40-inch. The distant companion is noted in *A. G. Leiden*. The only other measure of that is:

1904.84	30°4	6″68	2*n*	Espin	8.0...10.0

[Espin (*Mon. Not.* **LXVI**, 144)...]

55 36 **10669.** **β 68.** Discovered with the 6-inch. No motion since 1875.

1882.68	151°0	1″82	1*n*	Perry
1892.67	151.6	1.97	3*n*	Wilson
1899.76	150.3	1.90	3*n*	Barnard
1901.00	151.7	1.86	6*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII,** 351)..Δ (**I**)...Perry (*Eng. Mech.* **XXXVI,** 65)... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

55 44 **10670.** 59 *Cygni.* **Σ 2743.** (= H **IV. 22.**) No change in AB. The faint star C first noted by H (IV); not in Σ. Espin measures a more distant star. The proper motion of the large star is 0″013 in 134°4 (Auwers).

A and B

1865.29	352°8	20″38	3*n*	Δ
1887.87	351.8	19.99	3*n*	T
1897.08	352.5	20.24	3*n*	Gla
1905.63	352.8	20.37	2*n*	β

A and C

1905.63	141°0	26″73	2*n*	β

[Ma (*F. S.* **II**)... Ma (**XIII**)... H¹... H (**IV**)... Pk... Δ (**II**)... β³... T (2899)... Davis (*A. J.* 344).... Glasenapp (**IV, V**).... Espin (*Brit. Ast. Ass'n* **III,** 228) (*Ast. and A.-P.* **XII,** 282)...β⁶...]

56 1 **10672.** **Ho 148.** The only later measure is:

1905.56	203°3	2″57	3*n*	Doo

[Ho (2779)...]

56 2 **10673.** See 435. The only later measure gives:

1899.66	299°1	0″32	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

56 6 **10675.** **β 1210.** (ACD = OΣ 425.) The close companion to the principal star of the triple, OΣ 425, was discovered with the 36-inch. There may be some change in the distance of AC. If this is due to a small proper motion in A, the small companion is moving with it.

A and B

1890.63	119°9	2″30	3*n*	β
1898.42	117.2	2.35	3*n*	β
1898.58	118.8	2.36	4*n*	Hu
1898.60	120.2	2.54	2*n*	A
1901.62	117.2	2.40	2*n*	Doo

A and C (= OΣ 425)

1847.49	27°6	12″33	3*n*	OΣ
1868.43	29.7	12.81	4*n*	Δ
1890.63	28.6	13.80	3*n*	β
1898.45	28.0	13.80	2*n*	β
1898.60	28.0	13.98	2*n*	A
1901.62	27.8	14.13	2*n*	Doo

C and D (= OΣ 425)

1851.70	135°0	....	1*n*	OΣ
1890.63	134.2	4″28	3*n*	β
1898.46	133.0	4.31	2*n*	β
1898.60	133.4	4.32	2*n*	A
1901.62	134.8	4.26	2*n*	Doo

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)... OΣ (**IX**)... Δ (**I**)... A (3585)... Hu (*Pub. L. O.* **V**)...Do (3931)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10676. 2 (λ) *Equulei.* **Σ 2742.** No change since 1831. 56m 17s
The components have a proper motion of 0″055 in 257°4 (Auwers).

1866.32	226°0	2″47	3*n*	Δ
1878.66	222.4	2.46	4*n*	Cin
1883.60	222.2	2.64	4*n*	Per
1894.89	222.6	2.68	5*n*	Coleman
1898.78	220.0	2.64	3*n*	A
1902.66	221.4	2.66	2*n*	Hu

[Ma (**IX, X, XI, XII, XIII, XV**)...H¹...H (**V**)...Mh...Bp...Se...Se³...Wr...J²...Hd...Ra (**XXI**)...Ba (**II**)...Da⁴...Kn...WS...Du...Δ (*Mem. Accad. Sci.*)...Δ (1032)...Δ (**I, II**)...Ferr...O. Stone (2201)...Cin⁵...LM...Lv¹...Pt...UL...Per...Per (2559)...Je (2407)...T (2899)...See (*Beob. Berlin* No. 6, 1892)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Maw (**I, IV**)...Glasenapp (**II**)....Knorre (3518)....Coleman (*Mem. R. A. S.* **LIII**)....A (3585).... *A. G. Leipzig*, p. 250.... *Annals Toulouse Obsy.* **III**....Bryant (*Mon. Not.* **LXIV,** 804)...]

10680. Noted as double in the *Harvard Zones*, with the description given in Part I. The 40-inch shows no companion of any kind, and no such pair in the immediate vicinity. 56 24

[β⁵...]

10683. See 436. No other measures. 56 47

[See (*A. J.* 431)...]

10684. **β 1290.** Discovered with the 40-inch. A pair of small stars, each with a faint companion. It is 64s *f* and 2′ *s* of 59 *Cygni* (Σ 2743). 56 50

1902.42	17°3	4″12	3*n*	Doo	9.4...9.7

[β (*Pub. Y. O.* **I**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10685. **Σ 2744.** In slow retrograde motion. These stars have a common proper motion: 56 58

Stumpe	0″166 in 245°8
Bossert	0.175 in 250.0
Paris	0.177 in 242.0

There has been no change in the distance since 1830. Probably a physical system.

1830.16	190°5	1″53	5*n*	Σ
1843.24	184.5	1.93	2*n*	OΣ
1863.74	177.4	1.49	7*n*	Δ
1882.20	171.8	1.56	4*n*	Hl
1883.66	170.0	1.54	3*n*	Per
1889.00	167.6	1.39	7*n*	HΣ
1892.66	167.7	1.28	2*n*	Gla
1895.85	166.6	1.44	2*n*	Collins
1897.73	165.1	1.54	3*n*	Doo
1901.72	163.0	1.37	3*n*	Bryant
1902.66	162.0	1.47	2*n*	Hu
1904.74	163.8	1.42	4*n*	Gr. Obsy.

[Ma (*F. S.* **I**)...Ma (**IX, X, XI**)...H (**V**)...Da³...Se...Se³...OΣ (**IX**)...Pl.., Flm.... Do (2303, 3023, 3466, 3681)(*Trans. R. I. Acad.* **XXIX**, Part 13).... Giacomelli (**III**)...WS...WS²...Gl... Sk...Lv¹...UL...Δ (1117, 1195, 1475) ...Δ (**I, II**)...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)... Sp (2133)...Sp (**II**)... Je (2450)...Per...Per (2559)...T (2899)... En (2678)... Maw (**I, III**)... Glasenapp (**II**)... Collins (*A. J.* 378)... Coleman (*Mem. R. A. S.* **LIII**)... Doolittle (*Pub. Flower Obsy.* **I**)...Sk⁵... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)... Lohse (*Pub. Potsdam Obsy.*)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXII**, 383; **LXIV**, 804; **LXVI**, 30)...]

56^m 59^s **10686.** 60 *Cygni.* **OΣ 426.** Unchanged. The proper motion is very small, 0″010 in 300°8 (Auwers).

1868.91	165°1	2″71	5*n*	Δ
1898.50	162.0	2.82	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

57 5 **10687.** **H 1606.** "In contact with a large nebula." The only measures are:

1901.62	186°0	18″39	3*n*	β	8.8... 9.7
1903.19	184.0	17.60	2*n*	Es	9.0...11.0

[β⁵...Espin (*Mon. Not.* **LXIV**, 679)...]

57 9 **10688.** **β 472.** Discovered with the 6-inch. So far without motion.

1893.67	6°0	0″77	3*n*	Wilson
1898.97	4.4	0.87	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)... Δ (I)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* I)...]

57 11 **10689.** **β 69.** (CD = **Ho 599.**) Discovered with the 6-inch. Probably no motion. All the later measures are given:

A and B

1881.62	313°9	0″88	2*n*	Ho
1882.68	313.5	1.22	1*n*	Perry
1884.22	313.7	1.41	6*n*	En
1891.84	316.5	0.95	3*n*	β
1898.79	312.3	0.93	8*n*	Gr. Obsy.

AB and C

1884.78	238°9	78″47	3*n*	En
1891.34	239.0	77.88	3*n*	β
1899.42	239.5	77.86	1*n*	β

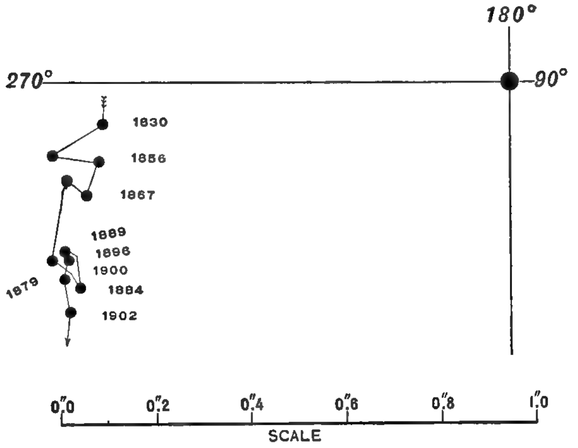
C and D (= Ho 599)

1895.65	155°0	18″40	2*n*	Ho
1899.42	153.0	18.91	2*n*	β
1904.76	154.6	18.75	3*n*	Doo

[β (I)....β (*Mon. Not.* **XXXIII**, 351)....β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)... Δ (I)...Perry (*Eng. Mech.* **XXXVI**, 65)...En (2678)... Lewis and Bowyer (*Mon. Not.* **LIX**, 400; **LX**, 513; **LXII**, 383).... Ho (3558).... Doolittle (*Pub. Flower Obsy.* **II**)...]

57 13 **10690.** **Σ 2746.** Slow retrograde motion, with but little change in the distance. The movement is practically rectilinear since 1830.

1830.82	276°2	0″87	5*n*	Σ
1835.63	279.3	0.98	2*n*	Σ
1856.86	281.2	0.89	2*n*	Se
1867.03	285.1	0.93	6*n*	Δ
1875.67	282.9	0.96	2*n*	Sp
1879.71	291°5	1″04	2*n*	Hl
1884.70	295.7	1.01	3*n*	Hl
1889.09	290.9	1.01	3*n*	HΣ
1896.78	292.3	1.01	3*n*	Hu
1900.50	294.1	1.03	3*n*	Doo
1902.88	297.6	1.05	2*n*	Do



Σ 2746.

[Ma (*F. S.* **I**)... Ma (**IX**)... Se... Se (*Comp. Rend.* **XLVIII**, 375)... OΣ (**IX**)... Flm... Δ (**II**)...WS²... Sp (2133)... Sp (**II**)... Per... Per (2559)...En (2786) ...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)... Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)... Hu (*A. J.* 397)... Lv (*A. J.* 407)... Soulé (*A. J.* 410)... Glasenapp (**V**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...Do (3931)...Lewis (*Mon. Not.* **LXVI**, 30)...]

10691. **β 1211.** Discovered with the 12-inch; the *f* star of a small triangle. The later measures are: 57^m 15^s

1897.72	347°6	0″67	3*n*	A
1897.75	349.0	0.52	1*n*	See
1900.77	347.5	0.51	2*n*	Doo

[β (**XVII**)....β (3047)(*Pub. L. O.* **II**).... A (*A. J.* 429)....See (3496)....Doolittle (*Pub. Flower Obsy.* I)...]

10693. **Ho 600.** No motion. 57 28

1901.93	81°1	1″93	5*n*	Doo

[Ho (3558)...]

10695. **H 1607.** There seems to be a decided change in angle and distance. These are all the observations: 57 36

1828	102°2	8″ ±	1*n*	H	
1873.53	92.9	8.38	3*n*	Δ	7.0...10.2
1905.65	86.0	9.86	3*n*	β	8.0...10.5

[Δ (1979)...Δ (I)...β⁶...]

10696. **β 156.** Discovered with the 6-inch. Change uncertain. The following are all the other measures: 57 39

1891.62	245°9	0″99	3*n*	β
1896.64	247.6	1.11	2*n*	Lewis
1899.05	242.7	1.09	7*n*	Doo
1899.81	245.6	1.00	3*n*	Gr. Obsy.

[β (**III**)... β (*Mon. Not.* **XXXIV**, 59)...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 513)...]

$57^m\ 40^s$ **10697.** **Σ 2747.** Without change.

1868.11	260°1	4″64	4*n*	Δ
1894.60	260.5	4.81	2*n*	Gla

[Ma (*F. S.* I)...Ma (**XI**)...H (**IV**)... Se...Wr... Ra (**XXIV**)... Ba (**II**)... Bp... Δ (1209).... Δ (**I, II**).... Glasenapp (**III**).... *Annals Toulouse Obsy.* **III**.... Maw (**IV**)...]

57 44 **10698.** 12 *Aquarii.* **Σ 2745.** (= **S 771.**) Fixed. No sensible proper motion, 0″005 in 303°8 (Auwers).

1866.13	191°6	2″76	3*n*	Δ
1886.66	189.1	2.79	3*n*	Hl
1896.28	192.2	2.77	5*n*	Coleman
1902.66	191.1	2.84	2*n*	Hu
1903.62	191.1	2.79	5*n*	Jouffray

[Ma (*F. S.* I)...Ma (**X, XI, XII, XIII, XV**)...H (**IV**)...Mh...Wr...Da^2...WJ... WJ^2... J^2... Hd... Ra (**XXI**)... Se... Se^2... Se^3... Se (1017)... OΣ (**IX**)... Δ (1195)... Δ (**I, II**)...WS ...Gl... Cin^4... Cin^5... Cin^6...Wilson (Cin^{10})... LM...UL...Hl (*Wash. Obsns.* 1886)... Hl (**II**)... Scott (*Brit. Ast. Ass'n* **V**, 75)... Glasenapp (**I**) ... Coleman (*Mem. R. A. S.* **LIII**) ... Solá (3497, 3679) ... *Annals Toulouse Obsy.* **III**....Do (3799)....Jouffray (*Bul. Ast.* **XXI**, 299).... Lohse (*Pub. Potsdam Obsy.*)...]

57 45 **10699.** **Ḫ IV. 113.** (= **Σ 2748** *rej* = **H 613.**) *Orange : indigo*, H; *gold : blue*, Δ. The faint star C was added by I. W. Ward with a 4.2-inch refractor. No change in either companion.

A and B

1877.79	299°8	18″78	3*n*	Δ	6.7... 9.0
1905.61	300.1	18.89	2*n*	β	...10.0

A and C

1905.61	249°8	26″13	2*n*	β	...12.0

[H (**IV**)...P. Smythe (*Mon. Not.* **XXIII**, 8)... Δ (I)...β^1...β^6...]

58 22 **10701.** **H 5244.** Nothing since H but the following:

1892.72	134°4	12″58	2*n*	Gla	9.2...9.7

[Glasenapp (**II**)...] (See p. 1083)

58 23 **10702.** **β 445.** *Cygni* **287.** Discovered with the 18½-inch. Lalande 40821. The later measures are:

1878.58	114°4	4″96	1*n*	OΣ
1881.89	108.9	4.73	3*n*	Ho
1884.66	111.1	4.99	2*n*	HΣ
1892.68	110.5	4.77	2*n*	Wilson
1901.62	107.8	4.90	3*n*	Doo

[β (**VIII**)....β (*Am. Jour. Sci.* July 1877).... Δ (I)....HΣ (**XII**)....OΣ (**X**)....Ho (2978)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

58 27 **10703.** **Ho 462.** The other measures are:

1896.12	216°7	2″14	3*n*	Ho
1902.63	217.1	2.50	4*n*	Doo

[Ho (3234, 3558)...]

58 29 **10704.** **H 3007.** The only measures are:

1877.71	222°9	7″52	2*n*	Cin	8.6...8.7
1905.72	224.2	6.81	4*n*	Doo	8.5...8.8

[H (**VIII**)...Cin^4...]

$58^m\ 34^s$ **10705.** **β 1138.** (= **Ho 282.**) Discovered with the 36-inch, but it is given in a list of new pairs subsequently published by Hough, by whom it was observed in 1888. No change since the first measures, but probably a physical pair. Common proper motion of 0″401 in 70°9 (Paris).

1888.82	185°8	0″3±	2*n*	Ho
1889.44	188.7	0.29	3*n*	β
1894.75	187.4	0.25	1*n*	Ho
1897.92	189.2	0.36	1*n*	Lewis
1898.72	185.7	0.32	2*n*	A
1905.70	183.1	0.28	3*n*	Doo

[β (**XVI**)... β (2956)(*Pub. L. O.* **II**)... Ho (2977, 3558)... Lewis (*Mon. Not.* **LIX**, 400)... A (3585)...]

58 38 **10706.** **OΣ 427.** Without change.

1867.95	148°9	5″21	4*n*	Δ
1886.79	149.5	5.13	2*n*	Ho
1898.63	149.7	4.83	4*n*	Hu

[OΣ (**IX**)... Δ (I)...Ho (2978)...Hu (*Pub. L. O.* **V**)...]

58 39 **10707.** **β 269 = β 835.** Discovered with the 9.4-inch at the Dartmouth College Observatory. It was again found with the 15½-inch of the Washburn Observatory, and inadvertently included as new in β (XII). It is possible that Ḫ I. 62 is identical with this pair, assuming an error of 1° in Herschel's declination of his pair. His place is in the same R.A., but is 1° south. There is no pair of his Class I in or near that place. Herschel measured the position-angle twice, 234°8 (1783.40) and 237°1 (1802.80). If direct motion should be shown by later measures of β 269, there would be but little doubt as to the identity of the two pairs. The measures in Cin^5 of β 269 and β 70 are transposed.

The following are all the measures:

1876.18	252°6	1″08	5*n*	Δ
1879.64	247.3	....	1*n*	Cin
1881.66	255.7	0.84	3*n*	β
1885.58	251.4	1.15	3*n*	HΣ
1887.74	253.2	1.02	3*n*	Com
1890.38	253.3	1.00	5*n*	Sp
1898.48	249.9	1.11	2*n*	Doo
1903.57	250.4	1.11	3*n*	Doo

[β (**V, XII**) ... β (*Mon. Not.* **XXXV**, 31; **XXXVII**, 280) ... β^4... Δ (I) ... Cin^6... Com (**VI**)...Sp (**III**)...Doolittle (*Pub. Flower Obsy.* **I, II**)...HΣ (**XII**)...]

58 39 **10708.** **β 1139.** Discovered with the 36-inch.

1898.79	140°8	2″05	3*n*	A	6.0...13.2

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...]

58 43 **10709.** **Se 3.** (AB = **Σ 2749** = **S 772.**) The close pair was discovered by Secchi in 1856, and independently by Dembowski in 1863. Slow direct motion in angle.

B and C

1856.64	127°0	0″6±	1*n*	Se
1865.07	142.2	0.8±	4*n*	Δ
1876.31	147.6	0.94	2*n*	Δ
1877.79	148.9	1.13	2*n*	β

1879.72	148°1	1″22	1*n*	Pt
1891.37	151.9	1.10	5*n*	β
1893.46	156.4	1.24	1*n*	Jones
1895.74	154.6	1.07	1*n*	Lewis
1897.71	150.3	1.09	3*n*	A
1897.75	153.7	1.19	3*n*	Doo
1899.39	155.5	1.03	3*n*	Bryant
1901.37	154.8	0.88	1*n*	Lewis
1902.85	152.5	0.88	2*n*	Do

A and BC

1864.79	151°0	3″54	4*n*	Δ
1876.31	153.0	3.65	2*n*	Δ
1887.84	155.3	3.52	2*n*	Hl
1897.69	155.6	3.09	1*n*	A
1897.75	157.0	3.33	3*n*	Doo
1902.85	157.1	3.45	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)... Se...Δ (**II**)...Flm...Pt...Sk^2...Hl (**II**)... β^1...β (2020, 3048, 3142)(*Pub. L. O.* **II**)... Jones (*A. J.* 312)... Glasenapp (**II**) ...Collins (*A. J.* 378)...A (*A. J.* 429)...Maw (**III**)...HΣ (**XII**)... Sk^5... Do (3466, 3681, 3931)...Doolittle (*Pub. Flower Obsy.* **I**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXII**, 383)...Biesbroeck...]

$58^m\ 47^s$ **10711.** **A** 177. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

58 48: **10712.** **♅ I. 62.** There is no pair of Class I in this place. There is probably an error of 1° in the declination of ♅, making it identical with β 269 (No. 10707). ♅ has another measure of the angle, 237°1 (1802.79) 1*n*.

58 50 **10713.** **Σ 2751.** *Cephei* 83. Apparently unchanged. The angle in Σ appears to be too small. There has been no motion since 1869.

1837.68	347°7	1″53	1*n*	Da
1841.22	349.4	1.70	2*n*	OΣ
1853.88	347.1	1.81	1*n*	Da
1869.67	349.3	1.62	5*n*	Δ
1882.04	349.9	1.65	3*n*	Je
1889.67	349.9	1.62	3*n*	Hl
1898.66	349.6	1.82	2*n*	A

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H^1...H (**IV**)... H^2... Da^2... Da^3...Wr... Se... Harkness (*Wash. Obsns.* 1867)...Δ (1125, 1195)...Δ (**I, II**)... Sk^3... OΣ (**IX**) ....Bl (**V**)....En (1518, 1674).... Hl (**II**).... Je (2450).... Glasenapp (**III**).... A (3585)...]

(See p. 1083)

58 52 **10714.** **β 70.** Discovered with the 6-inch. The measures in Cin^5 of β 269 and β 70 are transposed.

B and C

1879.64	95°0	(3″59)	1*n*	Cin
1899.04	96.5	5.39	3*n*	Doo
1899.50	96.2	5.33	2*n*	β

A and B

1899.50	239°1	79″06	2*n*	β

A and C

1899.04	237°0	75″11	3*n*	Doo

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**)...Cin^5... Doolittle (*Pub. Flower Obsy.* **I**)...]

10715. **H 1609.** "Very elegant." Another pair of small stars about 40″ from B. $58^m\ 53^s$

1902.58	37°8	7″92	2*n*	β^6	9.8...9.9

10716. **H 1608.** "A star 14 m in the same line, and another 15 m in the opposite direction". No change. Many stars in the field. 59 9

1879.63	257°9	19″80	2*n*	Cin^5	7.2...11.0
1901.54	257.6	19.57	2*n*	β^5	7.4...10.7

10717. **A. G. 269.** Double in *A. G. Berlin.* Measures by Miller (*A. J.* 546). 59 11

10718. **Σ 2750.** (= **H** 273.) Probably fixed. 59 18

1866.25	280°5	15″97	3*n*	Δ
1894.61	280.0	16.55	2*n*	Gla
1905.78	281.2	16.20	1*n*	β

[Ma (*F. S.* I)....Δ (**II**)....Cin^5....Glasenapp (**III**).... *A. G. Leipzig*, p. 211.... Bryant (*Mon. Not.* **LXIV**, 804)...β^6...]

10719. **OΣ (App) 214.** The principal star is given a proper motion of 0″056 in 196°3 (Kustner). If this is correct, the other star has the same motion. 59 23

1905.61	185°2	57″31	2*n*	β

[Δ (**I**)...β^6...]

10721. **S 773.** (= σ 704.) No relative motion. There is a small star near C, 82°5 : 16″7. 59 56

1881.64	30°1	84″12	3*n*	β^4	8.3...8.5
1905.68	30.1	83.97	2*n*	β^6	9 ...9

10722. 24 *Capricorni.* **See 439.** Another position is: 0 6

1899.69	186°4	25″93	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10723. **Σ 2753.** The principal star has a small proper motion. The following are all the measures: 0 7

1831.88	346°1	31″15	2*n*	Σ
1847.70	346.4	30.58	1*n*	Ma
1866.17	344.3	30.49	3*n*	Δ
1879.57	342.0	30.39	1*n*	Cin
1896.69	343.6	29.86	1*n*	Ho
1905.74	341.7	30.05	2*n*	β

The measures of Σ, Δ and β give 0″035 in 48°8 for the proper motion of A.

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...Ho (3558)...β^6...]

10725. **Σ 2754.** One of the stars has a small proper motion. The following are the complete measures: 0 29

1829.32	303°2	34″58	2*n*	Σ
1843.71	303.4	34.15	1*n*	Ma
1865.62	302.3	33.38	6*n*	Δ
1879.64	301.4	33.28	1*n*	Cin
1894.62	301.2	33.04	2*n*	Gla
1903.88	300.3	32.72	1*n*	Bryant

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...Cin^5... Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**...Bryant (*Mon. Not.* **LXIV**, 804)...]

(See p. 1083)

$0^m\ 30^s$ **10726.** **A** 178. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

0 31 **10727.** **Σ** 2752. (AC = **β** 157.) The faint star, C, was noted with the 6-inch. The principal star has a large proper motion:

Porter	0″339 in 90°0
Paris	0.328 in 90.0
Rad^8.	0.308 in 97.5
Hedrick	0.440 in 90.1

The Struve companion is moving with it. The change in C corresponds to this movement, and therefore that star does not belong to the system. It will finally be nearer to A than B now is, the minimum distance of nearly 5″ being reached about 1932. All the measures are given. Madler (*Dorpat Obsns.* XI) has an angle, 26°5, which must belong to some other pair.

A and B (= Σ 2752)

1827.62	145°2	5″17	3*n*	Σ
1848.67	145.3	5.61	1*n*	Mh
1866.68	149.4	5.55	3*n*	Δ
1878.59	151.9	5.60	1*n*	β
1879.64	151.4	5.35	1*n*	Cin
1898.52	155.0	5.51	2*n*	β

A and C

1876.54	81°9	21″36	1*n*	Δ
1879.64	80.7	20.10	1*n*	Cin
1898.52	74.7	13.90	2*n*	β
1904.79	69.9	11.33	3*n*	β

These measures of C give for the most probable proper motion of A:

0″364 in 94°3

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)(*Pub. Y. O.* I)...β^1...Cin^5...Mh...Δ (**II**)...β^6...]

0 50 **10729.** **Σ** 2757. No material change.

1868.38	269°3	1″74	4*n*	Δ
1886.81	267.3	1.99	1*n*	HΣ
1894.60	267.7	1.81	2*n*	Gla
1902.50	268.9	1.98	2*n*	Hu

[Ma (*F. S.* I)...Ma (**X**)...Se...Δ (**II**)...Glasenapp (**III**)...HΣ (**XII**)...]

1 ± **10730.** **Hall.** From Hl (I). Place approximate, and no suggestion of distance. There does not appear to be any 6m star catalogued in this place.

$1^m\ 1^s$ **10731.** **β** 368. *Aquarii* 45. The bright star was suspected to be a close pair with the 6-inch in 1873, and verified with the same instrument in 1875. In measuring this with the 36-inch, the double companion, CD, was detected. These are very faint stars, and require a large aperture. There seems to be no sensible change thus far in the close pair. The principal later measures are given. Lalande 40892.

A and B

1878.11	89°9	0″69	3*n*	Δ
1879.24	89.6	0.67	4*n*	Cin
1881.63	90.4	0.63	3*n*	β
1886.69	90.1	0.70	2*n*	LM
1886.60	93.3	0.66	2*n*	Lv
1890.64	88.7	0.58	3*n*	β
1892.10	90.2	0.58	4*n*	Sp
1892.68	92.1	0.60	3*n*	T
1898.58	89.0	0.61	1*n*	A
1900.73	87.6	0.70	6*n*	Doo

C and D

1898.58	316°1	5″14	1*n*	A

AB and C

1898.58	30°9	12″20	1*n*	A

[β (**VI**)...β (2062, 3048)...β^4...β (*Pub. L. O.* **II**)... Δ (I)...Cin^4... Cin^5...Wilson (Cin^{10})...LM. .Lv^1... Sp (**III**)... T (3186)... Pt... A (3585)... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

1 14 **10732.** 61 *Cygni.* **Σ** 2758. (= **H** **IV.** 18 = **Sh** 329.) The system of 61 *Cygni* is so well known that it is unnecessary to enter into the details here. Its large parallax and rapid proper motion make it one of the most interesting of the stellar systems. The components have nearly the same movement in space. This is given by Auwers from meridian positions:

A = 5″191 in 51°52
B = 5.121 in 53.68

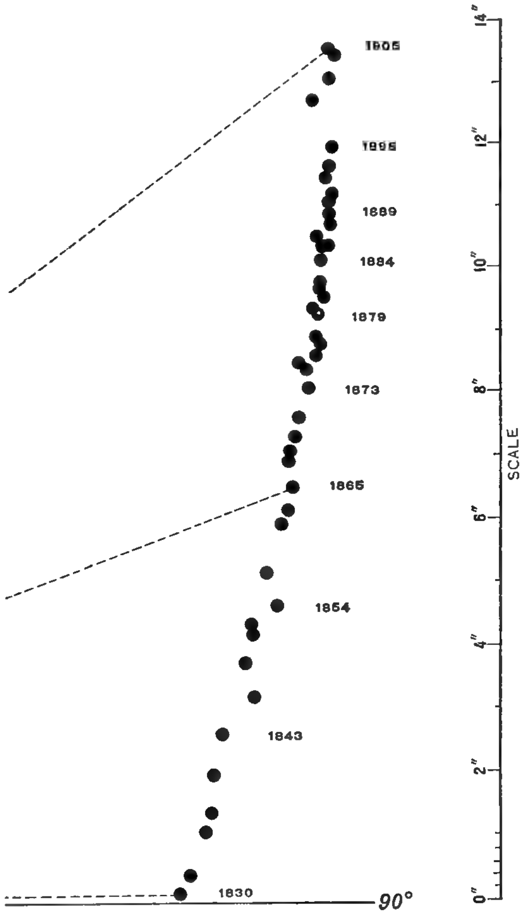
So far, the relative motion is practically rectilinear. If the companion is moving in a curved path, it will require the measures of at least another half century to make this certain. The deviations of the measured positions during the last seventy years from a right line are less than the average errors of the observations. The apparent annual movement of B is 0″183 in the direction of 170°.

The observations preceding 1830 are uncertain or approximate, and cannot be used in an investigation of the relative motion. Peters, from measures to 1883, finds a period of 782.6 years (A. N. 2708).

The following measures by leading observers are shown by the 45 positions on the diagram:

1830.68	90°6	15″47	3*n*	Σ
1830.84	90.3	15.64	9*n*	Bes
1832.09	91.5	15.74	3*n*	Σ
1835.65	93.8	15.97	6*n*	Σ
1837.06	94.8	16.01	7*n*	Σ
1838.88	95.3	16.20	10*n*	Bes
1840.05	97.1	16.01	6*n*	K
1840.24	96.7	16.47	4*n*	Da
1841.81	97.6	16.10	6*n*	K
1843.53	99.0	16.67	3*n*	OΣ
1843.64	99.5	16.51	5*n*	Ma
1846.87	101.0	17.07	2*n*	Da
1847.46	100.9	17.02	3*n*	OΣ

1849.59	102°.9	17″.02	4n	Da
1850.30	102.4	17.18	2n	OΣ
1850.94	103.0	16.80	4n	Ma
1851.81	103.7	17.34	3n	OΣ
1852.41	104.1	16.92	20n	Ma
1852.67	104.5	17.46	2n	OΣ
1853.85	104.7	17.24	2n	Peters
1853.94	104.8	17.28	10n	Ma
1854.25	105.2	17.57	2n	OΣ
1854.55	105.0	17.63	5n	Ma
1854.73	105.6	17.29	7n	Da
1856.62	107.2	17.79	4n	Ma
1856.43	107.9	17.25	2n	Lu
1857.20	106.5	18.02	2n	OΣ
1857.63	107.0	17.93	9n	J
1860.80	108.8	18.23	3n	OΣ
1861.73	109.6	18.12	7n	Ma
1862.83	109.8	18.38	5n	Ma
1862.97	109.5	18.36	12n	Δ
1865.15	110.7	18.54	18n	Δ
1867.16	111.8	18.72	16n	Δ
1867.89	112.1	18.49	4n	Du
1868.54	112.5	18.81	4n	OΣ
1868.82	112.3	18.62	6n	Du
1869.28	112.9	18.90	12n	Δ
1869.89	113.0	18.83	8n	Du
1870.90	113.5	18.91	2n	Du
1871.07	113.9	19.18	14n	Δ
1873.05	114.6	19.38	15n	Δ
1873.87	115.1	19.41	3n	Du
1874.74	116.1	19.42	2n	OΣ
1875.09	115.6	19.55	13n	Δ
1875.95	115.7	19.39	3n	Du
1876.70	116.0	19.63	4n	Je
1876.76	116.0	19.80	6n	OΣ
1877.17	116.4	19.76	13n	Δ
1877.84	116.5	19.85	6n	Je
1878.13	117.0	19.89	4n	OΣ
1878.28	116.7	19.74	6n	Do
1878.45	116.7	19.71	3n	Sp
1878.58	117.1	19.97	5n	Δ
1879.71	117.7	19.98	6n	Hl
1879.80	117.6	20.12	4n	Je
1880.24	117.7	19.74	7n	Franz
1880.74	117.9	20.09	5n	Hl
1880.96	118.1	20.16	4n	Je
1881.24	118.4	20.29	4n	Je
1881.60	118.2	20.18	5n	Hl
1882.65	119.2	20.24	3n	OΣ
1882.76	118.6	20.31	5n	Hl
1883.64	119.0	20.39	5n	Per
1883.77	118.9	20.58	3n	Hl
1883.93	119.2	20.33	4n	Sp
1884.67	119.7	20.50	6n	Hl
1884.91	119.9	20.49	4n	Sp
1885.71	120.3	20.62	5n	Hl
1886.64	120.5	20.71	6n	Hl
1886.79	120.4	20.68	2n	HΣ
1886.92	120.1	20.74	2n	Eng
1887.68	121.0	20.58	7n	Sp
1887.69	120.5	20.76	6n	Hl
1888.75	120.9	20.95	6n	Hl
1889.28	121.5	20.94	2n	HΣ
1889.65	121.5	21.09	7n	Hl
1889.78	121.3	20.93	10n	Giacomelli
1890.70	121°.9	21″.06	6n	Hl
1890.87	121.9	21.15	4n	β
1891.63	122.0	21.24	6n	Hl
1891.77	122.1	21.15	2n	HΣ
1893.28	122.8	21.22	6n	Cohn
1894.58	123.6	21.51	7n	Chofardet
1894.85	122.9	21.29	2n	Maw
1895.74	123.9	21.57	3n	Com
1895.77	123.6	21.66	2n	Collins
1899.79	126.0	21.56	2n	Coleman
1899.79	125.4	21.92		Gr. Obsy.
1900.53	126.4	21.85	1n	Lohse
1902.87	126.2	22.20	2n	Do
1903.73	126.8	22.52	3n	Biesbroeck
1905.41	127.2	22.50	8n	β



61 Cygni. Σ 2758.

[Σ^1...Ma (304, 324)...Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...H^1...H^2...H (**IV**)....K....K (409, 1519)....Bes....Bes (365, 401)(*Mon. Not.* **IV**, 152)....Ek (**I, II**)...Bp...Da^1...Da^2...Da^3...Wr...Auwers (1393, 1411–16)...*Durham Obsns.* 1846–48....Houzeau (498)....*Ast. Jahr.* 1815–17–18....J (*Mon. Not.* **X**, 170)...J^2...J^3...WJ...WJ^2...P^1...P^2...Wh...Se (1017)...Se...Se^1...Se^2...Se^3...Lu (1103)(**I, II, III**)...Peters (865, 1042, 2708, 3157)(*Ergänzungs-Heft, Ast. Nach.*)....Giacomelli (**III**)....Ra (**XXI, XXII, XXV, XXVIII, XXIX, XXX, XXXV, XLVII**)...Ba (**I, II, III, IV**)...Hd...Pritchard (*Mon. Not.* **XLVII**, 444)...Cooper (2155)...Flm...Flm (*Études et Lectures sur l'Astron.* **V**)(*Comp. Rend.* **LXXX**, 171, 662)....Faye (*Comp. Rend.* **XXXV**, 741)....Du....Pl....Big....Pk....Perry (*Eng. Mech.* **XXXVI**, 65)....

Wilson (*Mon. Not.* **XXXV**, 323)...WS...WS²... Kn...Sk... Sk²... Sk³... Sk⁴....Sk⁵.... Do (2199, 2242, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13).... Bl (*R. I. Acad.* 2d series, **III**) (*Observatory* **II**, 137)(*Mon. Not.* **XLI**, 162) (*Dunsink Obsns.* **III**, **V**)....OΣ (**IX**, **X**)(*Mem. Acad. Sci. St. Petersburg.* **XXVII**).... Δ (1032, 1195, 1475, 1573, 1736, 1799, 1888, 1979, 2081, 2193).... Δ (*Mem. Accad. Sci.*)... Δ (**I**, **II**)... Hl (*Wash. Obsns.* 1879 App. **I**, 1880–86) (*Sid. Mess.* **II**, 1)... Hl (**I**, **II**)... Franz (2590)... Goldney (2257)... Je (2407, 2450, 3802)... Mann (*Sid. Mess.* **II**, 18; **IX**, 385; **X**, 13)... Knorre (*Beob. Berlin*, No. 6, 1892)... Per... Per (2559)... Sp (**II**, **II** App.)... T (2866)... Engelhardt (**II**)....*Handbook of Double Stars*, p. 135....β (2957)(*Pub. L. O.* **II**)(*Sid. Mess.* **X**, 1)... Maw (**I**, **II**)... Glasenapp (**II**, **III**)... Big (*Bul. Ast.* **XII**, 299)... Cohn (3240)... Jacoby (*Mon. Not.* **LIV**, 117)... Collins (*A. J.* 378)... Com (**X**) ...Belopolsky (3338)...Hu (*A. J.* 397)... Soulé (*A. J.* 410)... Chofardet (3450) ....Morgan (*A. J.* 439).... Schur (3590).... Greenwich Obsy. (*Mon. Not.* **LX**, 519)...Gl (*Mon. Not.* **LXI**, 556)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)... Thiele (3837)...Coleman (*Mem. R. A. S.* **LIV**)...Biesbroeck...Lau (4078)... Lohse (*Pub. Potsdam Obsy.*).... Bergstrand (*Trans. Roy. Soc. Upsala* **I**, No. 3)...β⁶...]

$1^m\ 16^s$ **10733.** **Σ 2756** *rej.* Measures from Cin⁵. There is a 6m star in the field, 285°6 : 79″24 (1905.93) 1*n*. The only other measure of the Σ pair is:

1905.86	51°5	11″53	2*n*	β⁶	9.0...11.1

1 20: **10735.** **H 274.** Not in DM, but closely *f* DM (11°) 4483.

1901.58	91°5	9″49	2*n*	β⁵	10.6...11.0

1 24 **10736.** **β 473** Discovered with the 6-inch. In SD 8.0m. No motion. A 12.7 m star, Cogshall 357°2 : 25″37 (1898.67) 2*n*.

1893.53	114°9	1″88	2*n*	Lv	8.5...10.0
1893.81	118.5	1.79	1*n*	Wilson	8.5... 9.5
1898.65	118.0	1.82	3*n*	Cg	8.2... 9.7

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (**I**)...Lv (*A. J.* 382)...Wilson ( )... Cogshall (*A. J.* 478)...]

1 24 **10737.** **Σ 2755.** Fixed.

1866.71	82°9	23″99	3*n*	Δ

[H (**VII**)...Mh...Ma (*F. S.* **II**)...Δ (**II**)...]

1 24 **10738.** **β 679.** This close and exceedingly minute pair was discovered with the 18½-inch. It is too faint for the DM. It is in a low-power field *sp* the 8.8m star, DM (43°) 3802. The following are all the measures:

1878.10	68°1	0″38	2*n*	β
1889.45	65.6	0.52	3*n*	β
1896.56	54.0	0.42	1*n*	Lewis

[β (**X**)...β¹...β (2957)(*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400)...]

1 26 **10739.** **Ho 149.** No sensible change. The later measures are:

1888.72	326°8	0″90	4*n*	β	8.2... 8.7
1892.75	326.2	0.57	2*n*	Ho	8.5... 8.5
1897.84	324.3	0.76	3*n*	A	
1899.66	327.4	0.66	3*n*	Hu	9.2...10.0

[Ho (2779, 3234)...β (2875)(*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...]

$1^m\ 29^s$ **10741.** **Σ 2759.** The change is evidently due to proper motion. The following are all the measures:

1830.86	316°4	14″57	3*n*	Σ
1843.80	317.2	14.50	1*n*	Ma
1865.63	320.4	15.17	3*n*	Δ
1889.09	322.8	15.80	3*n*	HΣ
1896.51	324.4	16.06	2*n*	Lv
1896.57	323.5	15.73	4*n*	Soulé
1897.66	324.1	16.42	2*n*	Gla
1901.71	326.1	16.10	1*n*	Hu
1905.77	325.0	16.10	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)... Lv (*A. J.* 407)... Soulé (*A. J.* 410) ...Glasenapp (**V**)...HΣ (**XII**)...β⁶...]

1 32 **10742.** **H 275.** These are the only observations:

1828	1°4	20″±	1*n*	H	8	...11
1905.76	352.7	23.85	1*n*	β	8.3	...10

[H (**IV**)...β⁶...]

1 37 **10743.** **β 158.** Discovered with the 6-inch. In the field *f*, a new double nebula was found at the same time (Dreyer 7026). The other measures are:

1879.57	314°6	10″72	1*n*	β
1891.57	314.1	10.84	2*n*	β
1898.86	313.9	10.89	4*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β³...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

1 41 **10744.** χ *Capricorni.* **H 3009.** The proper motion of the large star is 0″053 in 186°0 (Auwers). The only measures are:

AB	1900.71	66°1	67″00	2*n*	β⁶	
BC	1900.71	89.4	18.25	2*n*	β⁶	11.0...12.2

The 40-inch shows a 15m star nearer A, 109°5 : 39″2 (see No. 10806.)

1 52 **10746.** **Σ 2760.** (= S 774.) The change in the position of the companion is almost wholly in distance. The proper motion of the principal star from the measures is 0″103 nearly in the direction of B. The components will finally make a close pair with a minimum separation of 0″6 about 1960.

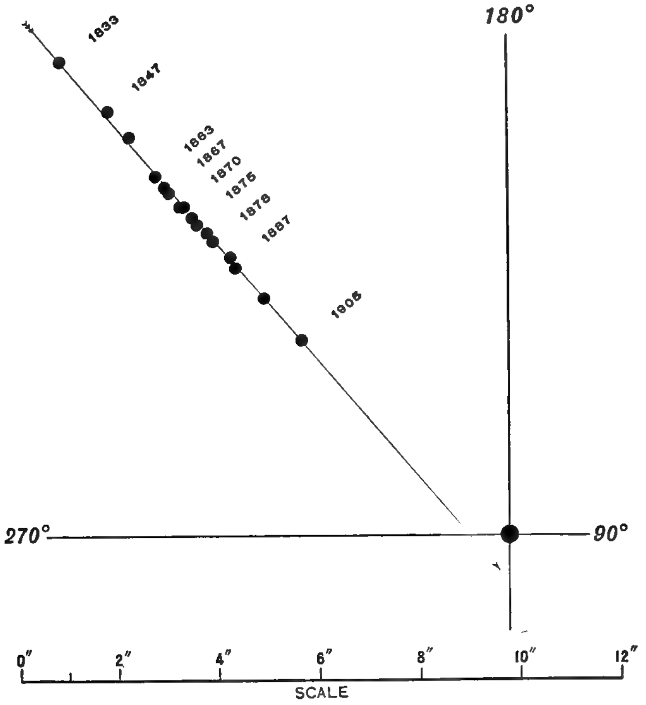
The following measures are shown on the diagram:

1833.95	223°7	13″08	5*n*	Σ
1847.90	223.5	11.68	4*n*	OΣ
1855.81	223.8	11.02	2*n*	OΣ
1863.02	224.7	10.11	5*n*	Δ
1865.22	224.9	9.83	10*n*	Δ
1867.11	225.0	9.68	13*n*	Δ
1869.19	225.1	9.35	10*n*	Δ
1870.96	224.9	9.24	12*n*	Δ
1873.05	225.1	8.98	13*n*	Δ
1875.03	225.2	8.79	8*n*	Δ

1877.24	225°1	8″57	9*n*	*Δ*
1878.44	225.5	8.36	2*n*	*Δ*
1885.70	225.3	7.87	3*n*	Hl
1887.80	225.9	7.63	3*n*	HΣ
1893.72	226.5	6.82	2*n*	Gla
1905.38	227.2	5.71	3*n*	*β*

Biesbroeck measures a distant 9.3m star:

1903.90	152°9	60″46	1*n*



Σ 2760.

[Ma (*F. S.* **II**)....Ma (**IX, XIII, XV**)....Σ^1....H^1....Bp....Da^3....Wr....K....K (1519)....Ra (**XXIII**).... Ba (**III, IV**).... OΣ (**IX, X**).... Do (*Trans. R. I. Acad.* **XXIX**, Part 13).... Do (2199, 3681).... Flm (*Études et Lectures sur l'Astron.* **VI**)... Flm ...Du...Pl...Hd...*Δ* (1117, 1195, 1475, 1573, 1736, 1888, 1979, 2081, 2193)...*Δ* (**I, II**)...UL...WS...Gl... Sk... Sk^2...Je (2450)...Per ...Per (2559)... Hl (*Wash. Obsns.* 1885)... Hl (**I, II**) ...Wellman (*Beob. Berlin*, No. 6, 1892)...Jones (*A. J.* 312)...Glasenapp (**III**)...Collins (*A. J.* 378)... Chofardet (3450)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Thiele (3837)... Sk^5...Biesbroeck...*β*^{6}...]

$1^m\ 52^s$ **10747.** **β 680.** Discovered with the 18½ inch. The following are all the other measures:

A and B

1877.57	131°4	0″5±	1*n*	*β*	8 ...8+
1885.53	309.0	0.70	2*n*	HΣ	
1890.74	306.7	0.58	6*n*	Sp	
1891.65	310.1	0.64	3*n*	*β*	8.4...9.2
1900.58	306.4	0.64	3*n*	Doo	8.2...8.8

AB and C

1885.52	33°6	23″41	1*n*	HΣ
1890.58	34.2	23.95	1*n*	Sp

[*β* (**X**)...*β*^{1}... *β* (3114)(*Pub. L. O.* **II**)...*Δ* (**I**)...Sp (**III**)... HΣ (**XII**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10748. **Hu 691.** The only other measure is: $1^m\ 53^s$

1904.74	318°7	0″25	1*n*	Lewis

[Hu (*Bul. L. O.* No. 57)...Lewis (*Mon. Not.* **LXVI**, 31)...]

10749. **OΣ 527.** There may be some change in the angle, but the motion is very slow. The measures in Ma (XIII) of OΣ 429 *rej.* belong to OΣ 527. 2 1

1845.68	322°0	0″3±	1*n*	Ma
1846.85	306.2	0.40	1*n*	OΣ
1851.72	306.8	0.45	1*n*	Ma
1852.64	295.1	0.33	1*n*	OΣ
1859.65	290.6	0.46	1*n*	OΣ
1878.35	285.0	0.52	3*n*	*β*
1884.78	283.6	0.49	1*n*	Hl
1886.73	277.8	0.33	2*n*	Hl
1888.88	280.7	0.45	2*n*	Sp
1893.28	284.0	0.37	2*n*	Com
1898.52	281.5	0.39	5*n*	Hu
1900.55	269.5	0.43	2*n*	*β*
1901.71	267.4	0.29	2*n*	Bryant

[OΣ (**IX**)...Ma (**XIII**) as OΣ 429...*Δ* (**I**)...Flm...Sk^3...Lv^1... LM ...*β*^{1}...Callandreau (*Bul. Ast.* **XII**, 523)...*β*^{3}...Hl (*Wash. Obsns.* 1884, 1886)... Hl (**II**) ... Big (*Bul. Ast.* **XII**, 299)... Com (**X**)... Bryant (*Mon. Not.* **LX**, 513; **LXII**, 383)...Do (3681)...Hu (*Pub. L. O.* **V**)...Sp (**III**)...*β*^{5}...]

10750. **H 3011.** This star is DM (5°) 4707. It has a proper motion of 0″170 in the direction of 206°0 (Porter). A comparison of Herschel's position with the recent measures points to common proper motion, if this faint star is the one he saw. 2 1

1900.70	232°7	17″23	2*n*	*β*^{5}	...14.5

(See p. 1083)

10752. **Σ 2761.** Fixed. 2 10

1868.90	112°1	5″30	4*n*	*Δ*
1894.57	113.0	5.45	2*n*	Gla
1902.10	112.6	5.70	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Se...*Δ* (**II**)...Cin^5...Glasenapp (**III**)...]

10753. **Ho 150.** Fixed. 2 24

1896.25	136°4	2″51	2*n*	Ho
1904.74	136.9	2.65	4*n*	Doo

[Ho (2779, 3558)...]

10754. **β 836.** The principal pair was discovered with the 15½-inch of the Washburn Observatory, and it was then stated that C might also be double. This was verified with the 36-inch in 1888, thus making a pretty but difficult quadruple group. All the later measures are given. 2 27

A and B

1888.08	189°6	0″65	3*n*	Com
1889.29	191.4	0.63	4*n*	*β*
1898.69	183.4	0.78	4*n*	A
1901.68	190.9	0.63	2*n*	Doo

C and D

1898.69	67°0	1″32	2*n*	A
1901.66	62.3	1.37	3*n*	Doo

AB and CD

1888.15	218°9	27″46	3*n*	Com
1889.29	219.4	27.45	4*n*	β
1898.63	219.1	27.49	3*n*	A
1901.66	220.1	28.00	3*n*	Doo

[β (**XII**)...β^{4}...β (2957)(*Pub. L. O.* **II**)...Com (**VI**)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

3m 28s **10755.** **β 988.** Discovered with the 18½-inch. The later measures are:

A and B

1893.81	226°2	1″28	2*n*	Wilson
1899.50	227.1	1.39	3*n*	Doo

A and C

1893.81	53°3	15″08	2*n*	Wilson
1899.50	50.7	15.03	3*n*	Doo

[β (**XIII**)...β^{3}...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

2 41 **10759.** **A 758.** With later measures (*Bul. L. O.* No. 61) of the close pair the mean is:

1904.53	353°1	0″28	3*n*	A	9.1...10.0

2 43 **10760.** **β 837.** Discovered with the 15½-inch at the Washburn Observatory. Without change.

1886.84	186°1	3″33	4*n*	UL
1887.77	189.3	3.53	3*n*	Com
1898.54	187.1	3.44	5*n*	Doo
1898.84	187.0	3.47	1*n*	β

[β (**XII**)...β^{4}...UL...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

2 52 **10762.** **Hu 765.** (AB = **Σ 2764** = **S 777.**) The companion was found to be a close pair by Hussey in 1904. With another measure his mean result is:

1904.49	43°6	0″46	2*n*	Hu	8.8...9.0

No change in the position of this with reference to A:

A and BC

1867.58	300°9	6″75	4*n*	Δ
1895.64	300.0	6.98	2*n*	Gla
1905.66	299.8	7.04	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...H (**IV, V**)...Wr...Δ (**II**)...Glasenapp (**IV**)...Lau (4078)...Espin (*Mon. Not.* **LXIV**, 677)...β^{6}...]

2 58 **10763.** **See 440.** A later position is:

1898.72	71°4	10″25	3*n*	Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...]

3 ± **10764.** **H 5515.** "An equilateral triangle". N. P. D. in H is 86° 88′ (sic); in his general catalogue it is given as 86° 31′. I could not find anything answering the description between 2° and 3° declination (1875.) The 40-inch shows a new pair near this place (see No. 10770.) Nothing found in the immediate vicinity agreeing with Herschel's description.

10766. **OΣ 428** *rej.* Rejected in second edition of the *Poulkowa Catalogue.* Without change. 3m 4s

1898.48	256°2	24″27	3*n*	Hu
1901.56	256.3	24.16	2*n*	β

[Ma (**XI, XIII**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...β^{5}...]

10767. **H 3010.** Probably fixed. 3 4

1877.73	300°2	28″39	1*n*	Cin	8.5...9.2
1890.55	299.4	28.17	2*n*	Gla	9.1...9.8

[Cin^{4}...Glasenapp (**I**)...]

10770. **β 1330.** Found in looking for H 5515 (No. 10764). 3 16

[β^{6}...]

10772. **OΣ 429** *rej.* Rejected as single by OΣ in the second edition of the *Poulkowa Catalogue.* Ma (XIII) has two measures credited to this pair, but they certainly belong to OΣ 527 which is near the other. It was single to Δ in 1867; with the 18½-inch in 1878; and the 36-inch in 1899. It is safe to say this star is not double. 3 22

[Ma (**XI, XIII**)...Δ (**I**, p. 230)...β^{1}...Hu (*Pub. L. O.* **V**)...]

10773. **Σ 2762.** (= **H II. 97** = **S 775.**) Without material change. 3 33

1870.22	312°9	3″46	6*n*	Δ
1882.64	310.5	3.49	1*n*	Ho
1891.65	311.8	3.41	4*n*	Gla
1900.72	311.2	3.77	2*n*	Do
1902.82	311.2	3.37	2*n*	Doo

There is a distant 9.2m star not in Struve:

1865.43	225°1	57″67	1*n*	Δ
1889.63	225.8	58.44	2*n*	Gla

[Se...Wr...H (**IV, V, VII**)...Ma (324)...Ma (*F. S.* **II**)...Du...Ferr...Gl...Ra (**XXII**)...Δ (*Mem. Accad. Sci.*)...Δ (**I, II**)...Δ (1032, 1209)...WS...WS^{2}...Sk^{2}...Ho (2978)...Glasenapp (**III**)...Collins (*A. J.* 378)...Knorre (3300, 3632)...Do (3681)...Greenwich Obsy. (*Mon. Not.* **LXVI**, 31)...*Annals Toulouse Obsy.* **III**...Sk^{5}...Doolittle (*Pub. Flower Obsy.* **II**)...]

(See p. 1084)

10774. **Σ 2771.** Fixed. The components have a small proper motion, 0″012 in 146°9 (Kustner). 3 33

1868.95	213°4	2″73	4*n*	Δ
1897.73	214.4	2.88	2*n*	Gla
1905.95	211.6	2.46	2*n*	Doo

[Ma (*F. S.* **I**)....Ma (**XI**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)....Δ (**II**)...Glasenapp (**V**)...]

10775. **Σ 2763.** The measures are discordant, and motion uncertain. 3 52

1843.71	292°4	16″29	1*n*	Ma
1847.98	290.1	16.70	1*n*	Ma
1852.78	293.8	16.46	1*n*	Ma
1865.26	294.2	16.96	3*n*	Δ
1878.51	294.1	17.45	2*n*	β
1879.54	293.6	17.19	1*n*	Cin
1895.63	292.5	17.36	2*n*	Gla

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII, XV**)...Δ (**II**)...Cin^{5}...β^{1}...Glasenapp (**IV**)...]

(See p. 1084)

3^m 54^s **10777.** **Σ 2766.** No change.

1865.56	250°.0	4″.85	3*n*	Δ
1895.75	249.3	5.00	2*n*	Gla
1905.56	250.0	5.09	1*n*	Lau

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Se...Δ (**II**)...Glasenapp (**IV**)...Lau (4078)...]

4 0 **10779.** Noted as double in *Harvard Zones.* Measures from ⅃ (I). Apparently unchanged.

1901.56	316°.9	0″.86	2*n*	β^5	8.9...9.2

4 26 **10781.** **S 779.** (= σ 710.) The only observation since 1824 is this:

1900.99	10°.4	112″.57	2*n*	β^5	7.5...8.5

There are two or three faint stars between, and many in the field.

4 30 **10782.** γ *Equulei.* **Knott 2.** (AC = **β 71**; AD = **Σ 54, App. I.**) Distant star noted with the 6-inch. The proper motion of γ *Equulei* is given:

Auwers	0″.170 in 169°.0
Paris	0.177 in 162.0

This corresponds to the change in C shown by the measures. Knott's companion has the same proper motion as the principal star, and hence this is probably a physical pair. The measures show no relative motion.

γ *Equulei* and 6 *Equulei,* about 6′ distant, make **Σ** 54, App. I.

A and B

1877.73	274°.5	2″.16	1*n*	β
1883.77	274.6	2.17	3*n*	Hl
1888.82	275.4	2.14	3*n*	β
1897.82	273.2	2.40	4*n*	A
1898.55	275.0	2.30	1*n*	β
1900.79	276.4	2.54	3*n*	Hu
1901.56	273.3	2.33	1*n*	Lewis
1901.59	272.0	2.19	3*n*	Doo

A and C

1877.73	10°.0	41″.34	1*n*	β
1888.82	9.2	43.33	3*n*	β
1898.57	7.9	44.30	3*n*	β
1901.58	7.6	45.02	3*n*	Doo

A and D

1866.28	153°.0	361″.68	8*n*	Δ
1891.57	152.9	355.89	3*n*	Mai

[β (I)....β (*Mon. Not.* **XXXIII**, 351)....β^1....β (2875)(*Pub. L. O.* **II**)....Doolittle (*Pub. Flower Obsy.* **II**)...]

The following relate principally to B and D:

[Knott (*Mem. R. A. S.* **XLIII**)(*Mon. Not.* **XXVIII**, 47; **XLVII**, 11)....Δ (**II**)....Δ (1574)....En....Ra (**XXV**)....Hl (**II**)....Pt....T (2899)....Je (2343)....Maiebckato (*Obsns.* 1892)...A (*A. J.* 429)...Lewis (*Mon. Not.* **LXII**, 383)...Hu (*Bul. L. O.* No. 44)...]

39 **10783.** **H 5251.** "Duplex" in O. Arg. Probably fixed.

1877.38	305°.0	8″.75	3*n*	Cin	8.0...8.3
1885.62	305.6	8.50	1*n*	W	8.5...9.0
1893.72	303.0	8.27	1*n*	Scott	

[Cin^3...Cin^4...Wilson (Cin^{10})..Scott (*Mon. Not.* **LIX**, 427; **LXIV**, 52)...]

10784. **Dunér 3.** Approximate place in Dunér. Identified and measured. 4^m 40^s

1902.57	198°.3	6″.10	2*n*	β	9.5...9.5

[Du...β^6...]

10785. **Arg. 42.** "Duplex" in O. Arg. N. The components are DM (47°) 3306 (8.5) and 3307 (9.0). The only measures are: 4 45

1904.49	57°.6	23″.85	2*n*	β^6	8.2...8.7

10787. **β 251.** Discovered with the 6-inch. Apparently fixed. 4 53

1879.69	234°.4	....	1*n*	β
1896.74	231.3	3″.08	3*n*	See
1901.61	232.4	3.05	3*n*	Doo

[β (V)...β (*Mon. Not.* **XXXV**, 31)...β^2...Cin^4...See (3496)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

10788. **Ho 151.** The only later position is: 4 54

1895.07	190°.5	1″.14	3*n*	Ho

[Ho (2779, 3234, 3558)...]

(See p. 1084)

10789. **Hu 766.** The mean result of this and two later measures is: 4 55

1904.51	113°.5	0″.88	3*n*	Hu	8.4...10.0

[Hu (*Bul. L. O.* No. 65)...]

10791. **H 3012.** No motion. 5 0

1877.73	320°.0	26″.09	1*n*	Cin	9.0...10.0
1892.81	320.2	25.88	2*n*	Gla	9.2... 9.5

[Cin^4...Glasenapp (**II**)...]

10792. **Σ 2767.** (= **S 780.**) Unchanged. 5 1

1865.74	32°.3	2″.40	3*n*	Δ
1891.67	32.5	2.77	4*n*	Gla
1896.39	31.8	2.39	3*n*	Coleman
1904.82	30.4	2.35	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...H^1...Bp...Da^3...Se...Ra (**XXIV**)...Ba (**II, III**)...Du...WS...WS^2...Gl...Δ (**I, II**)...Glasenapp (**I, III**)...Coleman (*Mem. R. A. S.* **LIII**)...Knorre (3632)...*Annals Toulouse Obsy.* **III**...Greenwich Obsy. (*Mon. Not.* **LXIV**, 805; **LXVI**, 31)...]

10793. **A 760.** With a later measure (*Bul. L. O.* No. 61) the mean is: 5 2

1904.50	330°.0	3″.30	2*n*	A

10794. **Σ 2765.** (= H̥ I. 63 = S 778.) Fixed. A third 10–11 m near, H (V). These stars have a small proper motion (*A. G. Berlin*): 5 8

A = 0″.022 in 297°.2
B = 0.033 in 287.4

1866.32	85°9	2″85	3*n*	Δ
1891.64	84.6	2.95	2*n*	Gla
1903.77	85.9	2.73	2*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...H (**V**)...Bp...Se...Se^3...Ra (**XXIV**)...Da^1... Δ (1209)....Δ (**I, II**)....Glasenapp (**I, II**)....*Annals Toulouse Obsy.* **III**.... Lewis (*Mon. Not.* **LXIV**, 805; **LXVI**, 31)...]

5^m 8^s **10795.** Σ 2769. (= ♅ N. 8 = **S** 776.) Fixed.

1865.37	300°4	17″78	3*n*	Δ
1889.63	300.2	17.91	2*n*	Gla
1897.74	300.5	17.74	2*n*	Coleman

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII, XV**)... Ra (**XXIV**)... Δ (1209)... Δ (**I, II**)... Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Lewis (*Mon. Not.* **LXIV**, 805) ...Coleman (*Mem. R. A. S.* **LIV**)...]

5 21 **10796.** Σ̄ 2770. Fixed.

1868.24	245°5	7″54	4*n*	Δ
1878.92	245.0	7.65	3*n*	Cin
1892.72	244.0	7.11	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Mh...Δ (**II**)...Cin^5...Glasenapp (**II**)...]

5 32 **10797.** Σ 2772 *rej.* These are the measures since Struve:

1900.75	230°5	11″44	1*n*	Es	
1905.46	230.0	11.19	2*n*	β	8.9...9.2

[Espin (*Mon. Not.* **LXIV**, 680)...β^6...]

5 38 **10799.** Σ 2768. No change.

1866.68	194°7	7″63	3*n*	Δ
1878.25	194.5	7.83	2*n*	Cin
1890.54	194.0	7.57	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Mh...Se... Δ (**II**)...Cin^4...Cin^5...Glasenapp (**I**)...]

5 41 **10800.** **H** 1618. "Not noticed by Σ as double, though seen by him." This and Σ 2773 form a wide pair. There is a minute star between them. The 18½-inch shows that Herschel's 14 m companion is itself double, with distance of about 3″ (1877).

A and B

1879.57	167°4	21″70	1*n*	β^3	8.2...11.0
1902.24	170.6	20.64	3*n*	β^6	8.3...

B and C

1902.24	132°6	2″89	3*n*	β^6	11.5...12

5 42 **10801.** ♅ **I**, 47. (= σ 711 = **H** 5252.) The measures of ♅ are too discordant to furnish evidence of motion, and particularly as the later observations do not indicate any sensible change.

1783.55	354°8	....	1*n*	♅	
1802.66	336.8	....	1*n*	♅	
1836.10	328.0	....	1*n*	H	
1855.60	323.6	2″87	1*n*	Se	
1876.64	322.2	3.33	3*n*	Cin	8.0...8.0
1878.74	321.8	3.00	1*n*	Δ	8.0...8.0
1882.73	320.2	3.08	5*n*	Hl	
1890.54	321.3	3.40	2*n*	Gla	8.0...8.1
1903.70	319.1	3.53	2*n*	Scott	
1903.72	318.8	3.23	5*n*	Jouffray	

[H (**VIII**)...Se^3...Flm... Do (3023, 3799)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (**I**, p. 356)....Sk^3....Pt....Cin^3....Cin^4....Cin^6....Lv^1....LM....Wilson (Cin^{10})...T (3186) ... Jones (*Proc. Haverford Coll. Obsy.* 1892) ... Hl (**I, II**) ...Hl (*Wash. Obsns.* 1884)...Glasenapp (**I**)...Scott (*Mon. Not.* **LXIV**, 52)... Jouffray (*Bul. Ast.* **XXI**, 299)...]

10803. Σ 2773. No change in AB. The third star was added with the 18½-inch. 5^m 50^s

A and B

1867.86	116°2	3″26	4*n*	Δ
1879.57	116.7	2.97	1*n*	β
1897.63	114.9	3.33	2*n*	Gla
1902.06	115.4	3.18	2*n*	β

A and C

1902.06	63°0	22″03	2*n*	β	...12.8

[Ma (*F. S.* **I**)...Ma (**X**)...H (**IV**)...Se...Δ (**II**)...β^3...Glasenapp (**V**)...*Annals Toulouse Obsy.* **III**...Espin (*Mon. Not.* **LXII**, 530)...β^6...]

10805. **A** 179. No other measures. 6 2

[A (3741)(*Bul. L. O.* No. 3)...]

10806. **H** 1617. "A small double star closely *f* a 6 m star whose place is given." In 1875 this was noted as a minute 10″ or 15″ pair, about 50″ from χ *Capricorni.* As there is no 6m star in the SD in the place given by Herschel, it is probable that this pair is BC of χ *Capricorni* (No. 10744). 6 6

10807. **Ho** 283. In 1884 Hough thought A was a close and very unequal pair; but it was not seen by him in 1887, and the 36-inch failed to show it in 1890, so it is probably single. 6 14

[Ho (2977, 3234)...β (3048)(*Pub. L. O.* **II**)...]

10808. β 159. (AC = **OΣ** (**App**) 215.) The close pair was discovered with the 6-inch. There is a faint star about 14″ from AB in the direction of 147°. All the other measures are given. 6 21

A and B

1882.68	300°0	1″34	1*n*	Perry
1889.53	316.7	1.28	3*n*	β
1898.56	316.6	1.22	4*n*	Doo

A and C

1886.48	189°5	134″21	4*n*	Franz
1889.53	189.4	134.16	2*n*	β
1898.56	189.5	133.64	4*n*	Doo

[β (**IV**)... β (*Mon. Not.* **XXXIV**, 382)... β (2957)(*Pub. L. O.* **II**)... Δ (**I**)... Perry (*Eng. Mech.* **XXXVI**, 65)... Franz (3080)... Doolittle (*Pub. Flower Obsy.* **I**)...]

10809. **OΣ** 430. There may be a little change in the angle. The following are all the measures: 6 35

1843.56	215°9	1″25	2*n*	Ma
1846.80	219.5	1.50	3*n*	OΣ
1867.90	215.5	1.43	4*n*	Δ
1887.43	211.7	1.48	3*n*	HΣ
1898.53	211.2	1.42	3*n*	Hu
1904.74	203.1	1.47	1*n*	Lewis

[Ma (**XI**)....OΣ (**IX**)....Δ (**I**)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**)....Lewis (*Mon. Not.* **LXVI**, 31)...]

$6^m\ 45^s$ **10812.** **H̄ 1619.** (= **H 1620.**) "Sextuple. C and D form a close double star *sp*. C and D 14m, E 15m, F 16m. E is *np*, distance 10″ or 12″. F is *sf*, distance 15″ or 20″." (See No. 10813.)

AB	1903.73	174°.4	7″.06	3*n*	Miller	9.0...10.0
	1905.48	174.7	6.89	2*n*	β^6	9.3...10.4
AC	1905.37	227.2	36.63	1*n*	β^6	...11.0
AD	1905.37	245.1	37.75	1*n*	β^6	...11.0

6 45 **10813.** **H 1620.** "Double-double." There is nothing in this place. Certainly an error of 1° in the declination of H, making it identical with H 1619 (No. 10812). That was readily found in the place given.

[β (*Mon. Not.* **XXXIV**, 380)...β^6...]

6 56 **10814.** **β 1303.** No other measures.

[β^5...]

6 57 **10815.** **OΣ 431.** Fixed.

1866.76	119°.1	3″.08	3*n*	Δ
1883.69	120.1	3.15	2*n*	Per
1898.59	120.4	3.08	3*n*	Hu

[Ma (**XI**)... OΣ (**IX**)...Da^3...Da^4...WS...WS^2...Δ (**I**)... Per... Per (2560)... En (2678)...T (2866)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

7 14 **10816.** **Σ 2774** *rej.* Measures by β^6.

7 20 **10817.** **Ho 152.** Probably unchanged.

1888.75	328°.9	0″.70	2*n*	β	8.6...9.2
1896.73	325.3	0.42	1*n*	Ho	
1900.79	323.6	0.52	9*n*	Bowyer	
1905.84	326.1	0.57	3*n*	Doo	8.2...8.6

[Ho (2779, 3558)....β (2930)(*Pub. L. O.* **II**).... Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 513; **LXI**, 486; **LXII**, 383; **LXVI**, 31)...]

7 31 **10818.** **β 270.** *Equulei* 19. (AD = **S 781** = σ 712). The close pair was discovered with the 9.4-inch of the Dartmouth College Observatory. So far there is no material change. All the other measures are given. A and D are respectively Lalande 41173 and 41179.

A and B

1877.72	347°.4	1″.26	1*n*	β
1885.61	353.2	0.67	2*n*	HΣ
1889.44	350.0	0.5 ±	7*n*	Sp
1891.60	347.5	0.70	2*n*	β
1898.71	344.9	0.61	3*n*	A
1898.73	347.7	0.56	1*n*	β

A and C

1877.72	32°.4	20″ ±	1*n*	β
1898.71	32.1	32.80	2*n*	A

A and D (= S 781)

1877.72	172°.6	183″.40	1*n*	β
1891.60	172.6	184.52	2*n*	β
1898.66	172.8	184.44	3*n*	β
1898.66	172.3	184.40	1*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)... HΣ (**XII**)...A (3585)...]

10819. **β 681.** Discovered with the 18½-inch. Without change. The other measures are: $7^m\ 40^s$

1884.61	232°.9	2″.86	2*n*	HΣ
1892.79	234.3	2.33	1*n*	Ho
1897.84	240.6	3.10	1*n*	Brown
1898.57	235.9	2.89	4*n*	Doo
1899.50	238.2	2.94	2*n*	β

[β (**X**)....β^1....β (*Pub. Y. O.* **I**)....Ho (3134)....HΣ (**XII**)....Brown (3646).... Doolittle (*Pub. Flower Obsy.* **I**)....]

10821. **H 3014.** Probably fixed. 7 43

1856.83	294°.8	2″.13	3*n*	J	8½...9
1877.67	295.9	2.30	2*n*	Cin	8.0...8.3
1897.11	297.6	1.96	3*n*	See	8.2...8.7
1897.64	297.1	1.91	3*n*	Scott	

[J^3...Cin^3...Cin^4...H (**VIII**)...See (3496)...Scott (*Mon. Not.* **LIX**, 427)...]

10824. **β 160.** Distant double companion noted with the 6-inch. 7 48

B and C

1899.30	114°.9	6″.23	7*n*	Doo

A and B

1899.30	154°.2	57″.47	7*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Wilson (   )....Doolittle (*Pub. Flower Obsy.* **I**)...]

10825. **H 278.** The only measure is the following: 8 0

1905.41	263°.2	23″.20	1*n*	β^6	9.2...10.5

In measuring this, a new pair was found which is not given in Part I. This is the 9.5m star, DM (9°) 4743, and is 42^s.5 *p* and 16′.7 *s* of H 278.

1905.53	195°.6	0″.79	1*n*	β^6	9.5...9.6

10826. **H 3015.** Nothing since H but this: 8 21

1905.53	275°.0	16″.21	1*n*	β^6	10.0...10.2

10827. **Σ 2775.** Since Part I was printed, Aitken has discovered the principal component of Σ 2775 to be a very close pair. 8 30

A and B

1904.71	43°.8	0″.14	3*n*	A	7.6...7.8

There has been no change in the Struve companion.

AB and C (= Σ 2775)

1868.42	177°.5	21″.41	4*n*	Δ
1879.58	177.2	21.40	1*n*	Cin
1892.76	177.8	21.47	2*n*	Gla
1904.67	177.7	21.27	1*n*	A

A wide pair of small stars in Cin^6 in exactly this place, 59°.9 : 99″.40 : 9.0...9.5 (1879.66) 1*n*.

[Ma (*F. S.* **II**)....Δ (**II**)....Cin^5....Cin^6....Glasenapp (**II**)....A (*Pub. A. S. P.* **XVI**, 268)(*Bul. L. O.* No. 66)...]

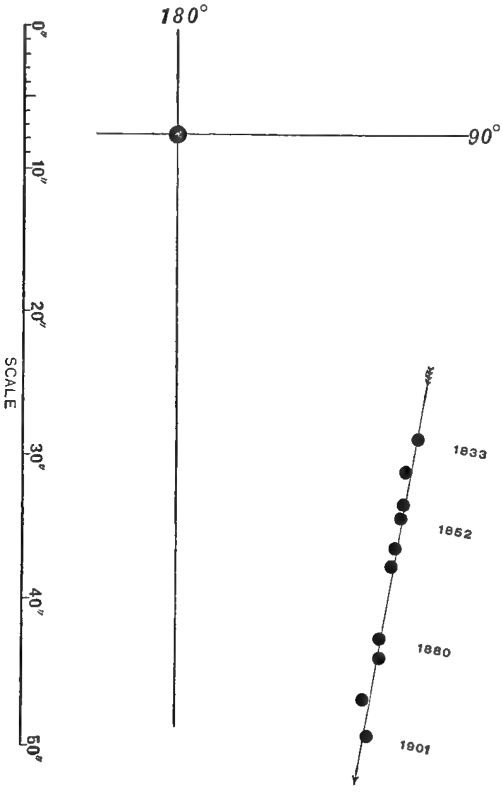
(See No. 13566)

$8^{m}\ 30^{s}$ **10828.** **β** 682. Discovered with the 18½-inch. No motion.

1885.66	103°5	5″74	2*n*	HΣ
1891.63	103.3	5.63	2*n*	*β*
1898.53	100.7	5.56	6*n*	Doo
1899.44	102.2	5.28	1*n*	*β*

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

8 38 **10829.** δ *Equulei.* **OΣ** 535. (AC = **Σ** 2777 = **H** IV. 37 = **S** 782.) The close pair was discovered by Otto Struve in 1852, and in a few years was found to be in rapid motion, the change, however, being only in distance. He suggested a probable period of about 13½ years, or possibly one half of that time. For some thirty years after the time of discovery, the measures were few and scattering, and were of little use in determining the time of revolution. Since then it has been well observed with the large refractors, and there is little doubt now of the correctness of the shorter period. Hussey has made an elaborate investigation of all the observations down to 1901, including a most valuable series of measures made at short intervals with the 36-inch refractor of the Lick Observatory, and deduced a period of 5.70 years. The components are practically of the same magnitude, and hence a correction of 180° may properly be applied to the position-angles of any of the measures. There is little question now that his interpretation of the observations is correct, and that so far as known δ *Equulei* has the shortest period of any known binary system.



δ Equulei. AB and C.

The following investigations of the period have been made:

1883	Burnham	10.8 yrs.	*Mem. R. A. S.* XLVII, p. [323]
1883	Wrublewsky	11.48	*A. N.* 2771
1894	See	11.45	*Evolution of the Stellar Systems*
1901	Hussey	5.70	*Pub. L. O.* V.

As Hussey has collected all the observations to 1901, it is unnecessary to give that material here. Some of the more recent measures at the Lick Observatory are:

1901.76	196°8	0″08	5*n*	A
1901.77	205.0	0.07	6*n*	Hu
1902.55	218.8	0.10	6*n*	Hu
1902.71	215.5	0.13	6*n*	A
1902.84	217.2	0.16	6*n*	Hu
1903.58	207.2	0.29	7*n*	A
1904.54	200.7	0.37	4*n*	A
1904.70	203.3	0.36	5*n*	Hu
1905.32	197.7	0.26	1*n*	Hu
1905.53	198.7	0.22	5*n*	A

The binary system has a large proper motion:

Stumpe	0″287	in	176°5
Auwers	0.289	in	176.5
Paris	0.379	in	166.2
Leavenworth	0.303	in	172.4

The last value is derived from measures of the distant Herschel companion.

AB and C

1833.20	38°8	27″40	12*n*	Σ
1841.65	34.8	28.82	1*n*	OΣ
1847.82	32.2	30.48	1*n*	OΣ
1852.24	30.9	31.22	2*n*	OΣ
1858.64	28.5	32.77	3*n*	OΣ
1863.75	27.3	33.92	13*n*	*Δ*
1880.60	22.7	37.98	5*n*	*β*
1883.63	22.0	39.25	3*n*	Per
1893.68	19.1	41.58	2*n*	Gla
1901.85	18.4	43.98	3*n*	Hu

These measures give for the most probable proper motion of AB, 0″301 in 170°6.

[Ma (**IX, X, XI, XIII, XV**)....Ma (*F. S.* **I**)....Σ^1....H^1....H (**VII**)....Da^1.... K (1519)...Flm...Flm (*Études et Lectures sur l'Astron.* **VI**)...Hd...Pk... Du....Kn....WS^2....Sk....Sk^3....OΣ (**IX, X**)....OΣ (*Mon. Not.* **XX**, 10).... *Δ* (1475) ... *Δ* (**II**)... Per...Per (2559)...Lv^1...Lv (*A. J.* 270)(*Proc. Haverford Coll. Obsy.* 1892) parallax...T (2899)... Ho (2978)...En (2678, 2742, 2786) ...Hl (**I, II**)...Hl (*Wash. Obsns.* 1886)...Glasenapp (2771)(**III**)...Engelhardt (**II**)...Sp (**III**) ... Big (*Bul. Ast.* **XII**, 299)... Everett (*Mon. Not.* **LVI**, 464)... β^1...β^2...β^3, pp, 313, 322...β^4...β (*Observatory* **VII**, 13)(*Sid. Mess.* **II**, 244) ....β (2340, 2875, 2957, 3142)(*Pub. L. O.* **II**) .... Com (**X**) .... See (3290, 3314) (*A. J.* 378)(*Evolution of the Stellar Systems*) .... Barnard (*A. J.* 447).... Knorre (3518)...Solá (3563)...Do (3466, 3681, 3931)...Gl (*Mon. Not.* **LXI**, 556) ...HΣ (**XII**)...Hadley (*Pop. Ast.* **XIII**, 323)...Campbell and Wright (*Bul. L. O.* No. 4)....Doolittle (*Pub. Flower Obsy.* **II**)....Biesbroeck....Lohse (*Pub. Potsdam Obsy.*) .... Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 418; **LXIV**, 805; **LXVI**, 31)...A (3585, 3639)(*A. J.* 429)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **XII**, 255; **XIII**, 125; **XIV**, 198; **XV**, 217)....Hu (*A. J.* 427)(*Pub. L. O.* **V**)(*Pub. A. S. P.* **XIV**, 195)(*Bul. L. O.* Nos. 32, 40)...]

10832. **Σ** 2780. Very little, if any, change. $8^{m}\ 45^{s}$

1869.25	226°3	1″08	4*n*	*Δ*
1894.58	224.5	1.10	2*n*	Gla
1899.83	223.6	1.22	3*n*	Maw
1905.95	226.2	1.36	2*n*	Doo

[Ma (*F. S.* **I**)... Ma (**X**)...H^1... H (**IV, V**)... Da^2... Se ... Bl (**V**)... OΣ (**IX**)... *Δ* (1125 ,1195)... *Δ* (**I, II**)...Glasenapp (**III**)...Maw (**IV**)...]

$8^{m}\ 50^{s}$ **10833.** **Hu 767.** With other measures (*Bul. L. O.* No. 65) the mean is:

1904.59	163°.4	0″.17	4*n*	Hu

$8\ \ 55$ **10834.** **Σ 2776.** (= H I. 46.) No material change.

A and B

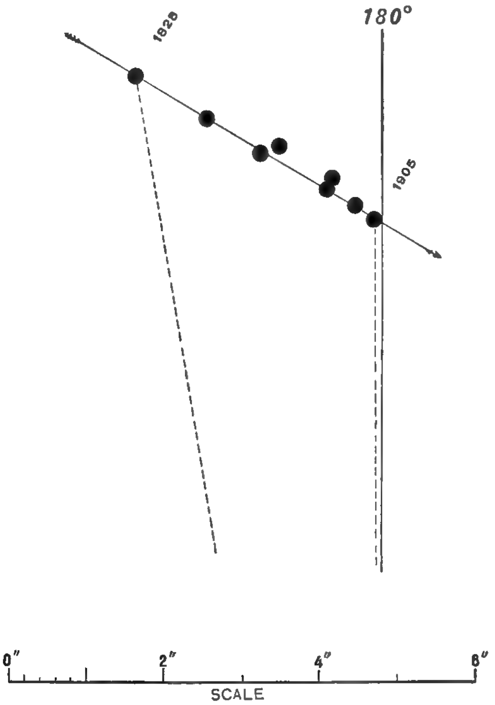
1867.07	51°.4	84″.72	3*n*	Δ
1880.74	51.5	84.24	3*n*	β

B and C

1867.07	338°.6	5″.54	3*n*	Δ
1880.74	339.7	5.79	3*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Mh...Bp...Da³...WS...Gl...Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Δ (**II**)...β³...]

$9\ \ 16$ **10835.** **Σ 2779.** One of the components has a proper motion of 0″.047 in the direction of 59° (± 180°). The following positions are shown on the diagram:



Σ 2779.

1828.81	189°.5	19″.22	2*n*	Σ
1849.47	187.0	18.54	6*n*	Ma
1866.87	185.0	17.99	7*n*	Δ
1869.81	184.2	18.09	4*n*	Du
1888.74	182.1	17.64	3*n*	Hl
1889.09	182.3	17.54	3*n*	HΣ
1896.77	181.1	17.30	2*n*	Gla
1905.86	180.3	17.11	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI, XII, XIII**)... H¹... Du... Flm...OΣ (**IX, X**)...Δ (1575)...Δ (**II**)...Sk²...Hl (*Wash. Obsns.* 1883)...Hl (**II**)...Glasenapp (**IV, V**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β⁶...]

10837. **OΣ (App) 216.** Without change. $9^{m}\ 23^{s}$

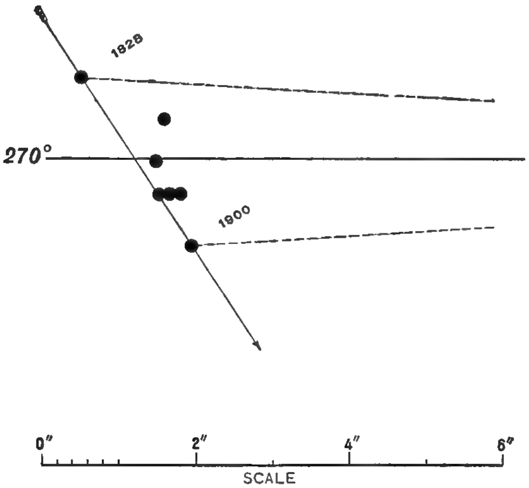
1887.72	47°.0	101″.89	7*n*	Franz
1905.45	47.0	101.89	2*n*	β

[Δ (**I**)...Franz (3080)...β⁶...]

10838. **Σ 2778.** The observations are not very accordant, but the change is evidently due to a small proper motion. $9\ \ 28$

The following are all the measures:

1828.24	267°.0	21″.19	4*n*	Σ
1843.69	268.4	20.10	1*n*	Ma
1865.33	269.9	20.21	5*n*	Δ
1877.75	271.8	.....	1*n*	Cin
1879.13	271.2	20.04	3*n*	Cin
1880.71	271.2	20.18	1*n*	Pt
1880.72	271.2	19.91	2*n*	β
1900.55	273.1	19.76	2*n*	β



Σ 2778.

[Ma (*F. S.* **I**)...Ma (**XI**)...Flm...Δ (1573)...Δ (**II**)...Pt...Cin⁴...Cin⁵...β³...β⁵...]

10839. **Hu 768.** With later measures the mean is: $9\ \ 36$

1903.86	124°.5	1″.66	3*n*	Hu	8.8...13.4

[Hu (*Bul. L. O.* No. 65)...]

10840. **Σ 2794** *rej.* Nothing later but the following: $9\ \ 37$

1905.47	92°.0	18″.35	1*n*	β	8.5...10.0

[H (**V**)...β⁶...]

10841. **OΣ 432.** Probably unchanged. The proper motion is given, 0″.042 in 38°.4 (Kustner) $9\ \ 43$

1867.01	128°.4	1″.16	4*n*	Δ
1875.63	126.4	1.21	3*n*	Sp
1897.85	126.2	1.28	5*n*	Hu
1901.79	125.6	1.37	4*n*	Do

[Ma (**XI**)....Da³....Da⁴....OΣ (**IX**)....Δ (**I**)....Du....WS....WS²....Newcomb (*Wash. Obsns.* 1867)...Pl...Per...Per (2560)...Sp (2133)...Sp (**II**)...Glasenapp (**III**)....Sk⁵.... Maw (**I**)....Hu (*A. J.* 397)....Do (3466, 3681, 3931)....Hu (*Pub. L. O.* **V**)...]

9m 52s **10843.** 14 *Aquarii.* Δ 24. Discovered by Dembowski in 1875. It was single with 36-inch in 1890, and has not been seen double by any one since 1875. There is considerable doubt as to this star being really double. The proper motion is 0″036 in 276°4 (Auwers).

[Δ (2086)...Δ (I)...β (3048)(*Pub. L. O.* II)...]

10 ± **10845.** **H** 5516. "Quadruple; all in a line." Nothing in this place in the star catalogues. The vicinity was carefully swept over with the 40-inch in 1900, but nothing found answering the description in H.

[β5...]

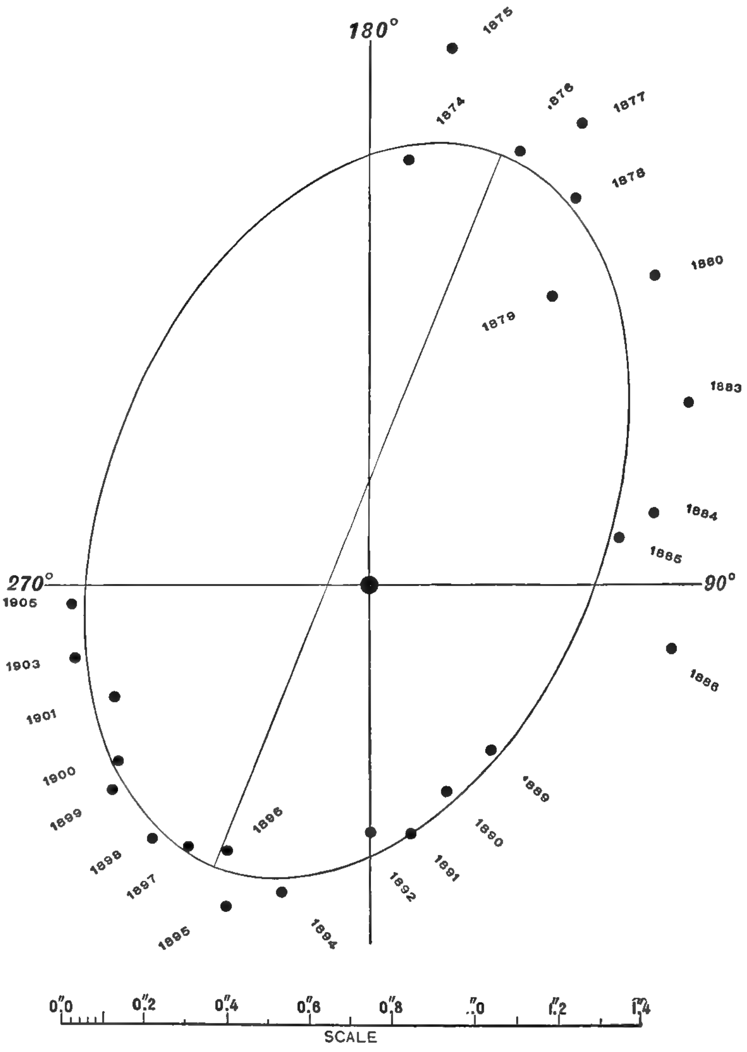
10 0 **10846.** τ *Cygni.* *A. G. Clark* 13. Discovered by Alvan G. Clark in 1874 with the 26-inch now at the McCormick Observatory. Dembowski's measures were sufficient to show angular motion. The companion has now passed over nearly 270° of position-angle, and the distance will slowly increase until one revolution has been completed.

The following investigations of the orbit have been made:

1886	Gore	53.87 yrs.	*A. N.* 2749
1892	Burnham	36.5	*Mon. Not.* LIII, 439
1899	See	56.25	*A. N.* 3629
1899	Aitken	45.1	*Pub. A. S. P.* XII, 103

The following are all the published measures of this pair, those marked (*) being shown on the diagram:

1874.89	162°6	1″11	2*n*	Newcomb
1874.90*	174.8	1.06	1*n*	Δ
1875.60*	171.4	1.35	4*n*	Δ
1876.79*	161.5	1.24	2*n*	Δ
1876.83	166.9	1.62	2*n*	Waldo
1876.90*	160.2	1.03	2*n*	Hl
1877.70*	155.3	1.26	8*n*	Δ
1878.41*	150.0	1.06	1*n*	β
1878.54*	147.5	1.09	3*n*	Δ
1878.76*	158.8	1.09	2*n*	Hl
1879.50*	148.3	0.90	2*n*	β
1879.75*	147.3	0.98	6*n*	Hl
1880.77*	137.4	1.04	1*n*	Frisby
1883.77*	119.6	0.91	1*n*	Young
1883.88	(159.2)	....	3*n*	Sk
1884.70*	104.1	0.72	2*n*	Young
1885.52	116.3	1.08	3*n*	T
1885.73*	100.7	0.62	1*n*	Hl
1886.78	80±	0.5±	1*n*	Ho
1886.80*	77.8	0.76	1*n*	HΣ
1887.76	56.4	0.4±	1*n*	Ho
1888.74	40.7	....	1*n*	HΣ
1889.49*	36.5	0.50	4*n*	β
1889.80	29.4	0.60	1*n*	HΣ
1890.54*	20.5	0.54	3*n*	β
1891.49*	12.4	0.61	3*n*	β
1891.69*	9.3	0.52	3*n*	Hl
1891.77*	6.9	0.70	4*n*	HΣ
1892.40*	2.3	0.61	3*n*	β
1892.71*	358.4	0.60	3*n*	Com
1894.77*	344.4	0.78	5*n*	Barnard
1895.71*	335.1	0.86	2*n*	Com
1895.73	332.6	0.3±	3*n*	See
1896.64	340°9	0″48	2*n*	Lewis
1896.55*	333.6	0.79	3*n*	A
1896.67*	330.9	0.69	3*n*	Com
1896.82*	332.1	0.73	6*n*	Hu
1897.57*	322.4	0.68	3*n*	A
1897.81*	328.5	0.72	5*n*	Hu
1897.71	326.4	0.94	3*n*	Do
1898.17*	323.0	0.86	3*n*	β
1898.49*	316.6	0.77	3*n*	A
1898.82	311.2	0.58	1*n*	Lewis
1899.73*	308°8	0″80	6*n*	A
1899.86*	310.0	0.85	3*n*	Hu
1899.78	313.3	0.92	3*n*	See
1899.78	312.3	0.85	3*n*	Brown
1899.86	307.2	0.60	1*n*	Lewis
1900.71	(196.8)	....	3*n*	Do
1900.60*	306.2	0.75	4*n*	Lohse
1900.75*	304.6	0.75	3*n*	A
1901.58	305.1	0.75	2*n*	Lohse
1901.78*	294.0	0.68	1*n*	A



τ Cygni. AB.

{1903.65*	280°.8	0".72	2*n*	A
{1903.85*	287.7	0.76	2*n*	Biesbroeck
1903.68	284.1	1. ±	1*n*	Lohse
1904.68	282.3	0.88 ±	2*n*	Lohse
{1905.37*	277.8	0.82	1*n*	β
{1905.49*	269.6	0.64	2*n*	A

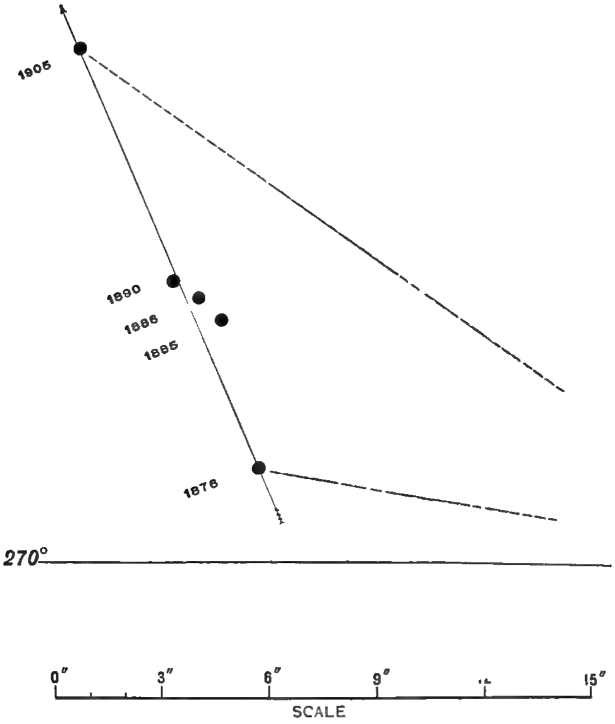
The system has a large proper motion:

Auwers	0".461 in 19°.1
OΣ	0.474 in 17.5

The last value is derived by OΣ from his measures of the distant star D (1851–1883).

A and C

1876.90	260°.3	15".68	1*n*	Hl	
1885.63	247.5	17.91	1*n*	Young	
1886.93	246.5	18.68	2*n*	Young	
1890.05	245.9	19.56	5*n*	β	...13.2
1905.37	234.7	25.25	2*n*	β	...13.5



τ Cygni. AC.

A and D

1851.84	213°.2	136".57	1*n*	OΣ
1852.67	213.0	136.40	2*n*	OΣ
1854.78	212.8	138.25	1*n*	OΣ
1866.72	212.1	143.03	1*n*	OΣ
1883.87	211.4	151.20	1*n*	OΣ
1905.36	211.1	161.14	1*n*	β

[Δ (2085, 2195)...Δ (I)..OΣ (**X**)...Hd...Flm...Sk²...Waldo (2190)...T (2866)... T (*Liv. Ast. Soc.* **V**, 41, 168)....Newcomb (*Wash. Obsns.* 1874)....Hl (2147) (*A. J.* 247)(*Wash. Obsns.* 1880, 1885)...Hl (**I, II**)...Gore (2749)...Ho (2978)... β (*Am. Jour Sci.* April, 1879)....β1....β3.... β (2930, 2957, 3048, 3114, 3142) (*Pub. L. O.* **II**, pp. 124, 248)(*Mon. Not.* **LIII**, 439).... Barnard (*A. J.* 447).... Everett (*Mon. Not.* **LVI**, 464)... Com (**X**)... Hu (*A. J.* 427)... Do (3466, 3681) ....See (3629)(*A. J.* 359).... Lewis (*Mon. Not.* **LX**, 513).... Brown (3646).... HΣ (**XII**)... Hadley (*Pop. Ast.* **XIII**, 325)... Biesbroeck... Lohse (*Pub. Potsdam Obsy.*)....A (3396, 3466, 3585, 3639)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **II**, 103)...β⁶...]

(See p. 1084)

10847. **H 1628.** The later measures show no change. 10m 14s

1873.49	253°.2	15".12	1*n*	Δ (I)	10.0...11.0
1905.36	253.9	15.07	1*n*	β⁶	

10849. **Σ 2781** (= **♅ I. 90** = **S 783**). Unchanged. (See No. 10874.) 10 20

1783.58	167°.6	....	1*n*	♅
1828.11	172.1	3".27	3*n*	Σ
1867.61	169.5	3.07	4*n*	Δ
1903.64	169.3	2.93	5*n*	Jouffray

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Mh...Bp....Se... Ra (**XXV**)... Δ (1209)... Pt... Cin⁵...Cin⁶...O. Stone (2201)...LM... Δ (**I, II**)... Glasenapp (**I**)... *Annals Toulouse Obsy.* **III**...Jouffray (*Bul. Ast.* **XXI**, 299)...]

10851. **β 1261.** This pair was discovered with the 18½-inch in 1884, but was not included in the lists of new pairs of that time. No motion. 10 29

1886.76	151°.5	1".39	2*n*	Ho
1895.88	150.6	....	1*n*	Sp
1897.84	148.2	1.57	3*n*	A
1901.73	152.3	1.63	3*n*	Doo

[β (**XVIII**)... β (3113)(*Pub. L. O.* **II**)... Ho (2978)... Sp (**III**)... A (*A. J.* 429)... Doolittle (*Pub. Flower Obsy.* **II**)...]

10852. **O. Stone 54.** No motion. The measures credited to this pair in Cin⁵ and Lv¹ belong to β 252 which is a short distance *f*. 10 42

1896.84	238°.0	7".17	3*n*	See	8.0...9.8
1901.63	238.8	7.08	3*n*	Doo	7.9...8.8

[Cin³...Cin⁴...Wilson (Cin¹⁰)...See (3496)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10853. **Ho 285.** Unchanged. 10 45

1895.27	26°.0	8".87	2*n*	Ho
1905.75	27.6	8.92	4*n*	Doo

[Ho (2977, 3558)...]

10854. **Σ 2783.** Slow motion in angle and distance. 10 48

1830.71	43°.2	1".56	2*n*	H
1831.79	43.2	1.33	3*n*	Σ
1841.22	41.3	1.56	2*n*	OΣ
1857.13	40.3	1.08	4*n*	Se
1867.60	37.3	1.14	4*n*	Δ
1894.60	31.0	0.72	1*n*	Gla
1896.92	29.8	1.03	3*n*	A
1896.90	29.5	1.11	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X**)... H¹...H (**IV, V**)...OΣ (**IX**)... Δ (1125, 1195)... Δ (**I, II**) ...Se...Glasenapp (**III**)...Hu (*A. J.* 397)...A (3466)...Brown (3646)...]

10855. **β 161.** The distant double companion was found with the 6-inch. The declination was erroneously given —5° 45′ in β (III). A and B are respectively S.D. (4°) 5404 and 5403, 8.3 and 9.3m. 10 53

The other measures are:

B and C

1898.71	318°5	7″40	1*n*	β
1899.96	318.3	7.34	3*n*	Doo

A and B

1898.71	349°9	100″94	1*n*	β
1899.96	349.8	101.04	3*n*	Doo

A and *a*

1898.71	318°0	33″90	1*n*	β

a and *b*

1898.71	19°2	10″86	1*n*	β	13.5...12.0

A and *b*

1899.96	331°5	40″55	3*n*	Doo

[β (III)...β (*Mon. Not.* **XXXIV**, 59)...β (3114)(*Pub. L. O.* **II**) ... Doolittle (*Pub. Flower Obsy.* I)...]

$11^{m}\ 12^{s}$ **10859.** Σ 2784. Without change.

1867.44	348°2	14″35	4*n*	Δ
1897.73	346.9	14.45	2*n*	Gla

[Ma (*F. S.* I)... Ma (XI)...H (V)...WS...Gl...Δ (II)...Glasenapp (V)...]

11 15 **10862.** H 1631. The following is the only measure:

1902.06	17°1	49″22	2*n*	β^{6}	7.2...11.2

11 15 **10863.** H I. 48. (= A. C. 19.) There are no measures after H of this pair until its re-discovery by Alvan Clark in 1859. Change doubtful; the later measures appear to show a little direct motion since 1860.

1783.18	259°8	....	1*n*	H	
1860.99	245.2	0″92	2*n*	OΣ	7.0...7.2
1861.52	245.9	0.92	5*n*	Da	7 ...7+
1873.11	247.6	0.95	3*n*	Δ	6.6...6.9
1882.04	249.8	0.86	6*n*	Je	
1889.67	250.6	0.64	3*n*	Hl	
1897.89	255.6	0.69	3*n*	Hu	
1900.26	251.4	0.71	3*n*	Doo	
1900.74	256.3	0.49	3*n*	A	

[Da^{4}....Da (*Mon. Not.* **XVII**, 257)....OΣ (X).... Δ (I)....Flm....WS....Sk^{2}.... Je (2450)...T (2991)...Hl (II)...Big (*Bul. Ast.* **XII**, 299)...Hu (*A. J.* 427)... A (*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* I)...Sk^{5}...]

1 45 **10864.** See 443. The other measures give:

1898.70	281°4	1″75	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11 46 **10865.** A 294. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

12 0 **10867.** H V. 45. Described in H as *f τ Cygni.* A good many small stars here, but nothing noted likely to be this pair (1876). Not found by Espin (*Mon. Not.* LXII, 533).

10869. H N. 139. I could not find any pair of Cl. I in this place (1873). In looking for this, β 1262 was found, and that is probably the pair observed by H. (See No. 10919). $12^{m}\ 6^{s}$

10871. β 162. Discovered with the 6-inch. Probably fixed. A 13m star in the direction of 138°5. 12 14

1880.77	241°5	0″98	1*n*	β
1883.91	67.0	1.28	5*n*	En
1891.63	243.5	1.09	3*n*	β
1903.33	244.7	1.18	3*n*	Doo

[β (III)... β (*Mon. Not.* **XXXIV**, 59) ... β^{3}... β (3114)(*Pub. L. O.* **II**) ... Δ (I)... Δ (2086)...En (2678)...Doolittle (*Pub. Flower Obsy.* **II**)...]

10874. H I. 90. (= σ 713). There is no double of Cl. I in or near this place. It is probably identical with Σ 2781. (No. 10849). 12 18

10878. See 444. Discovered by Cogshall. 12 36

1898.64	231°4	12″00	5*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

10879. Ho 153. The other measures show no change. 12 40

1893.80	113°6	0″64	1*n*	Ho
1897.08	113.3	0.69	3*n*	Ho
1905.75	115.8	0.78	4*n*	Doo

[Ho (2779, 3234, 3558)...]

10880. β 163. Discovered with the 6-inch. This promises to be a very interesting system. The following are all the observations: 12 47

1876.09	252°3	1″15	4*n*	Δ
1878.60	256.9	0.87	1*n*	OΣ
1884.31	254.3	1.19	3*n*	HΣ
1887.79	251.3	0.68	3*n*	Hl
1891.52	254.6	0.75	3*n*	β
1892.91	248.1	0.57	2*n*	Sp
1895.46	251.9	0.56	5*n*	Sp
1895.69	246.9	0.63	2*n*	Lewis
1898.74	253.2	0.63	3*n*	A
1899.63	249.7	0.69	1*n*	Bryant
1899.84	255.5	0.69	2*n*	Bowyer
1905.50	Single 36-in.		2*n*	A

A remarkable change seems to have taken place recently. The apparent orbit is probably a very elongated ellipse, and very much like that of 80 *Tauri.*

The close pair has some proper motion which is variously given from the meridian positions:

Bossert	0″196 in 124°2
Porter	0.075 in 180.0
Paris	0.134 in 144.4
Kustner	0.081 in 180.0

For an independent determination of this movement hereafter, I have measured a distant 10.9m star:

1901.25	9°3	82″44	3*n*	β
1905.64	8.9	82.64	1*n*	β

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3114)(*Pub. L. O.* **II**)... Δ (**I**)... OΣ (**X**) ... Hl (**II**)... Sp (**III**)... Lewis (*Mon. Not.* **LVI**, 359; **LX**, 514)... A (3585)... HΣ (**XII**)...β^{5}...β^{6}...]

12^{m} 49^{s} **10881.** **β 271.** Discovered with the 9.4-inch at the Dartmouth College Observatory. It is a most interesting binary from the large common proper motion of the components.

Porter	0″693 in 245°3
Paris	0.676 in 239.1

The other measures of the close pair are:

A and B

1878.66	232°5	2″22	2*n*	Cin
1886.78	237.5	2.77	1*n*	LM
1891.54	237.2	2.70	2*n*	β
1897.24	241.4	3.19	5*n*	See
1898.75	239.5	2.91	4*n*	Doo
1898.84	236.3	3.37	1*n*	β
1899.75	237.4	3.21	2*n*	Barnard
1901.75	238.7	3.12	3*n*	Doo

The change in the distant star corresponds to the proper motion of A.

A and C

1898.84	74°2	74″57	1*n*	β
1899.75	72.9	75.45	4*n*	Barnard

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3114)(*Pub. L. O.* **II**)...Cin^{3}...Cin^{4}...Cin^{5} ...Cin^{6}...LM...See (3496)... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

12 54 **10883.** **Σ 2785.** There is no evidence of motion. All the measures are given.

1832.10	234°9	2″49	4*n*	Σ
1844.89	237.6	2.80	1*n*	Ma
1869.09	235.7	2.71	5*n*	Δ
1882.64	235.6	2.82	1*n*	Ho
1894.60	236.3	2.94	2*n*	Gla
1903.88	242.7	2.97	1*n*	Lewis
1904.91	236.8	3.23	1*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**XI**)... Δ (**II**)... Ho (2978)... Glasenapp (**III**)... Lewis (*Mon. Not.* **LXIV**, 805; **LXVI**, 31)...]

12 58 **10884.** **β 252.** Discovered with the 6-inch. Unchanged. The measures in Cin^{5} and Lv^{1} of this pair are erroneously credited to another double in the vicinity, 2^{m} 16^{s} *p* and 4′ 47″ *n*.

1885.67	276°3	2″44	2*n*	Wilson
1888.65	277.7	2.65	1*n*	Lv
1891.73	279.2	2.67	1*n*	Collins
1896.89	276.9	2.59	2*n*	See
1897.74	276.8	2.55	2*n*	Scott
1901.62	277.0	2.43	3*n*	Doo

[β (**V**) ... β (*Mon. Not.* **XXXV**, 31)... Cin^{3}... Cin^{4} ... Cin^{5} ... Wilson (Cin^{10}) ... Lv^{1}.... Collins (*Proc. Haverford Coll. Obsy.* 1892) .... See (3496) .... Scott (*Mon. Not.* **LIX**, 427)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12 59 **10885.** *υ Cygni.* **OΣ 433.** (= **H 932.**) The components appear to be relatively fixed. A has a very small proper motion, 0″007 in 237°1 (Auwers). H called B and C *red.* There is a fourth star about twice the distance of C from A in the direction of 60°.

A and B

1867.97	219°8	15″05	3*n*	Δ
1878.44	218.5	14.77	1*n*	β
1898.68	220.5	15.12	3*n*	Hu

A and C

1867.97	178°4	21″27	3*n*	Δ
1878.44	177.9	21.38	1*n*	β
1898.68	179.9	21.37	3*n*	Hu

[H (**IV**)....OΣ (**IX**)....Ma (**XIII**).... Δ (**I**)....β^{1}....Glasenapp (**V**)....Hu (*Pub. L. O.* **V**)...]

10887. **Ho 154.** No motion. 1^{m} 34^{s}

1892.81	205°1	3″60	1*n*	Ho
1905.75	204.2	3.47	4*n*	Doo

[Ho (2779, 3234)...]

10888. **OΣ 436.** Fixed. 13 6

1868.05	230°0	11″66	4*n*	Δ
1898.66	229.2	11.91	3*n*	Hu

[OΣ (**IX**)... Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

10891. **β 289.** Discovered with the 26-inch at the Naval Observatory. In the field with *υ Cygni* (OΣ 433). The later measures are: 13 22

A and B

1881.64	130°4	0″67	1*n*	Ho
1898.76	140.5	0.89	1*n*	β
1898.82	139.2	1.00	3*n*	A

A and C

1898.75	261°5	6″28	1*n*	β	...12
1898.82	258.4	6.55	2*n*	A	...13.0

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^{1}...Ho (2978)...A (3585)...]

10892. **Hu 769.** With another measure the mean is: 13 34

1904.50	175°9	0″80	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

10893. **Hu 770.** With two later measures the mean is: 13 44

1904.53	306°5	1″02	3*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

10896. **Σ 2786.** *Equulei* 27. (= **S 784.**) Fixed. 13 47

1865.93	184°4	2″45	3*n*	Δ
1887.84	186.1	2.48	2*n*	Hl
1896.32	186.2	2.58	5*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**IX, X, XI**)...Σ^{1}...H^{1}...Bp...Da^{3}...Se...Wr...Ra (**XXIV**) ...Ba (**II**)...Flm... Δ (1209)... Δ (**I, II**)...WS^{2}...Hl (**II**)...Glasenapp (**II**)... Maw (**II**)...Coleman (*Mem. R. A. S.* **LIII**)...*A. G. Leipzig*, p. 250...*Annals Toulouse Obsy.* **III**...]

10897. **Σ 2788** *rej.* The only measure is the following: 13 50

1905.54	356°1	7″98	2*n*	β^{6}	8.5...9.7

14^m 1^s **10898.** **β 1140.** Discovered with the 36-inch. This star is surrounded by a faint nebula, about 12′ in diameter, discovered by Barnard by means of photography (*Mon. Not.* LIX, 369).

The later measures show no change:

1893.80	274°.1	4″.40	2*n*	Barnard
1898.31	276.6	3.86	2*n*	β
1901.63	274.0	4.25	4*n*	Doo

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...Barnard (*A. J.* 447)...Doolittle (*Pub. Flower Obsy.* **II**)...]

14 7 **10900.** **β 1304.** No other measures.

[β^{5}...]

14 13 **10901.** **A. G. 270.** Double in *A. G. Lund.* Measures by β^{6}.

1900.76	112°.8	5″.78	2*n*	Espin (*M. N.* LXIV, 680)

14 16 **10902.** **OΣ 434** *rej.* (= **Ħ IV. 39** = **H 614.**) Fixed.

1894.65	122°.4	24″.71	2*n*	Gla
1898.60	121.9	24.92	2*n*	Hu

[Ma (**XI**)...H^{1}...Δ (**I**)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

14 17 **10903.** **Ho 601.** The other measures are:

1898.65	177°.7	17″.66	1*n*	Hu
1903.60	177.3	17.35	7*n*	Doo

[Ho (3558)...Hu (*Bul. L. O.* No. 44)...]

14 32 **10906.** **See 441.** A later measure:

1898.76	15°.8	1″.94	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

14 33 **10907.** **Ho 602.** The only later position is:

1903.08	201°.5	2″.65	6*n*	Doo

[Ho (3558)...]

14 35 **10908.** **Ho 286.** The following are all the observations:

1894.75	236° ?	....	1*n*	Ho	
1900.71	196.7	0″.30	1*n*	Do	
1904.96	255.9	0.28	4*n*	Doo	6.5...6.5

[Ho (2977, 3558)...Do (3681)...]

14 39 **10909.** **Ho 155.** Probably fixed.

1893.68	34°.3	2″.09	1*n*	Ho
1899.39	34.9	2.04	4*n*	Doo

[Ho (2779, 3234)...Doolittle (*Pub. Flower Obsy.* **I**)...]

14 51 **10910.** **β 838.** Discovered with the 15½-inch at the Washburn Observatory. Probably unchanged. The following are all the other measures:

1884.65	93°.8	1″.84	2*n*	HΣ
1886.84	93.9	1.69	3*n*	UL
1887.77	95.8	1.71	3*n*	Com
1891.85	96.7	1.34	3*n*	β
1893.59	97.1	1.48	3*n*	Wilson
1894.57	101.1	1.82	1*n*	Barnard
1894.87	98.1	1.22	3*n*	Sp
1895.74	101.3	1.36	1*n*	Lewis
1896.66	98.7	1.66	3*n*	Lv
1897.74	93.8	1.39	3*n*	A
1897.85	100.9	1.65	1*n*	Brown
1900.72	97.9	1.40	4*n*	Bryant
1901.75	95.4	1.56	3*n*	Doo

[β (**XII**)...β^{4}...β (3114)(*Pub. L. O.* **II**)...UL...Com (*Sid. Mess.* **IX**, 78)(*Pub. Washburn Obsy.* **VI**)....Wilson (   )....Barnard (*A. J.* 447)....Sp (**III**)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LX**, 514; **LXII**, 383)....Lv (*A. J.* 407)....A (*A. J.* 429)....HΣ (**XII**)....Brown (3646)....Doolittle (*Pub. Flower Obsy.* **II**)...]

10912. **H 5265.** There is an obvious error in the first distance. 15^m 10^s

1879.65	19°.1	22″.85	1*n*	Cin	8.0...9.0
1890.57	191.1	32.19	2*n*	Gla	9.3...9.8
1901.67	192.8	31.62	2*n*	β	9.6...10.1

[Cin^{6}...Glasenapp (**I**)...β^{5}...]

10914. **OΣ 435.** Apparently unchanged. Variability in one of the components has been suggested. 15 20

1867.40	198°.1	....	4*n*	Δ	6.7...9.5
1879.63	206.6	0″.60	2*n*	β	
1883.71	26.9	0.65	2*n*	Per	7.5...7.7
1891.85	211.4	0.65	3*n*	β	8.4...8.5
1897.74	214.6	0.76	3*n*	A	8.4...8.5
1898.46	210.6	0.60	3*n*	Hu	7.5...8.0

[Ma (**XI, XIII**)....OΣ (**IX**)....Da^{3}....Δ (**I**)....Per....Per (2560)....β^{1}....β^{3}....β (3114)(*Pub. L. O.* **II**)...A (*A. J.* 429)...Hu (*Pub. L. O.* **V**)...]

10915. **A 295.** No other measures. 15 22

[A (3784)(*Bul. L. O.* No. 16)...]

10917. **H 281.** All the measures are given. The change in the distance is probably not real. 15 32

1829.57	336°.4	17″.52	1*n*	H	10...10-11
1879.54	335.8	13.50	2*n*	Cin	8.5...9.5
1896.63	335.3	14.08	3*n*	Lv	8.7...9.2
1901.66	334.6	14.03	2*n*	β	8.7...9.2

[H^{1}...Cin^{5}...Lv (*A. J.* 407)...β^{5}...]

10919. **β 1262.** Discovered with the 6-inch in 1873. The double, Ħ N. 139, is undoubtedly identical with this pair. Ħ has no measures or description beyond giving it as Class I, and his place is some distance *sp*, but there is no double star there. (See No. 10869.) There seems to be no relative motion. 15 40

1878.02	113°.8	2″.07	3*n*	Cin
1886.72	116.0	2.08	2*n*	LM
1891.85	113.3	1.79	3*n*	β
1897.72	112.3	1.98	3*n*	A
1900.52	111.1	1.86	4*n*	Doo

[β (**XVIII**) . . . β (3113)(*Pub. L. O.* **II**) . . . Cin^{3} . . . Cin^{4} . . . Cin^{5} . . . LM . . . A. (*A. J.* 429) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

$15^{m}\ 42^{s}$ **10920.** Σ 2787. Fixed. Glasenapp measures a distant star 9.8 m, 94°3 : 70″94 (1892.76) 2*n*.

1866.69	20°7	22″73	4*n*	Δ
1879.59	19.4	22.80	2*n*	Cin
1892.76	19.4	22.86	2*n*	Gla

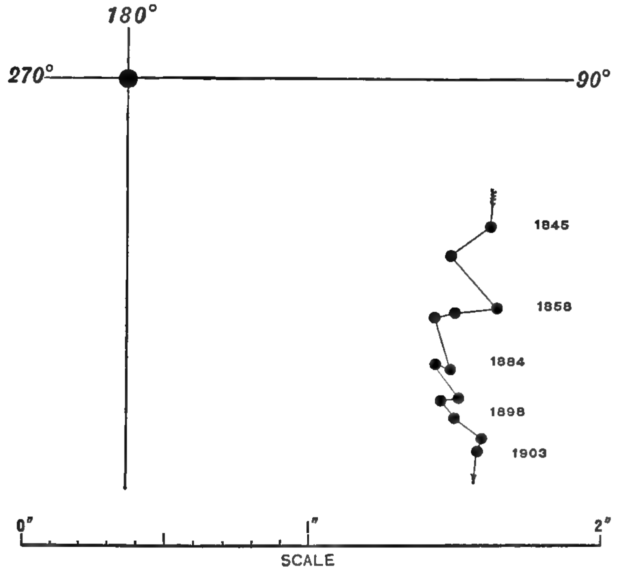
[Ma (*F. S.* **I**) . . . Ma (**X**) . . . H (**V**) . . . Δ (**II**) . . . Cin^{5} . . . Cin^{6} . . . Glasenapp (**II**) . . . *Annals Toulouse Obsy.* **III** . . .]

15 44 **10921.** β 446. Discovered with the 18½-inch. In the field with a 7 m star. The other measures are:

1893.65	265°4	2″96	3*n*	Wilson
1899.23	256.5	2.94	3*n*	Doo

[β (**VIII**) . . . . β (*Am. Jour. Sci.* July 1877) . . . . Wilson ( ) . . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

15 46 **10922.** OΣ 437. The motion of the companion in the last sixty years has been practically rectilinear at the rate of about 0″013 per year. The following positions are shown on the diagram:



OΣ 437.

1845.43	67°7	1″37	4*n*	OΣ
1851.98	61.3	1.29	4*n*	Da
1858.74	58.1	1.52	3*n*	OΣ
1866.57	54.5	1.40	4*n*	Δ
1873.16	52.1	1.36	4*n*	Δ
1884.38	47.9	1.52	6*n*	Per
1888.74	47.2	1.47	3*n*	Hl
1888.88	46.0	1.62	9*n*	HΣ
1894.60	44.3	1.57	3*n*	Gla
1898.60	43.9	1.64	3*n*	Hu
1901.59	44.5	1.76	3*n*	Doo
1903.78	43.2	1.78	1*n*	Bowyer

[Ma (**XI, XIII**) . . . OΣ (**IX**) . . . Flm . . . Δ (**I**) . . . Da^{3} . . . Du. . . WS . . . WS^{2} . . . Sk. . . Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Pl . . . Per. . . Per (2560, 2749) . . . . Je (2450) . . . . Kustner (2584) . . . . Ho (2978) . . . . En (2678) . . . . Sp (**II**) . . . . Gore (*Mon. Not.* **XLVII**, 62) . . . . Hl (**II**) . . . . Maw (**I, III**) . . . . Big . . . . Big (*Bul. Ast.* **XII**, 299) . . . Glasenapp (**III**) . . . Hu (*Pub. L. O.* **V**) . . . HΣ (**XII**) . . . Sk^{5} . . . Doolittle (*Pub. Flower Obsy.* **II**) . . . Bowyer (*Mon. Not.* **LXVI**, 31) . . . Lau (4078) . . .]

10923. S 786. *Cygni* .327. (= σ 717 = OΣ (App) 217.) $15^{m}\ 49^{s}$ The components are DM (52°) 2913 and 2911. The larger is given a proper motion of 0″033 in 180° (*A. G. Harvard*). No relative motion.

1824.61	302°4	48″74	2*n*	S	
1875.96	301.1	48.18	3*n*	Δ	6.5 . . . 8.5
1882.49	301.0	47.76	5*n*	Fr	6.9 . . . 8.4
1902.06	301.1	47.95	2*n*	β	7.2 . . . 8.4

[Δ (**I**) . . . Franz (2649) . . . Espin (*Mon. Not.* **LXII**, 533) . . . β^{6} . . .]

10924. A. G. 271. Noted "Obl." in *A. G. Lund.* It was 15 49 apparently single on 2*n* with the 40-inch in 1902.

10925. Σ 2790. B.A.C. 7417. Fixed. The principal 15 55 star has a proper motion of 0″027 in 150°7 (*A. G. Hels.*). The distant star was added by Barnard with the 36-inch. No other measures.

1864.50	45°7	4″47	3*n*	Δ
1893.80	42.8	4.45	2*n*	Barnard
1895.77	46.2	4.88	2*n*	Gla
1905.79	45.6	4.59	1*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**V**) . . . Se. . . Bl (**V**) . . . Δ (**II**) . . . Barnard (*A. J.* 447) . . . Glasenapp (**IV**) . . . β^{6} . . .]

10926. Σ 2789. Without change. Later observers reverse 16 7 the position-angle. The components are given a small proper motion, 0″065 in 0° (*A. G. Harvard*).

1869.50	117°1	6″00	5*n*	Δ
1894.58	116.8	6.19	2*n*	Gla
1901.01	116.1	6.01	3*n*	Espin

[Ma (*F. S.* **I**) . . . Ma (**X, XI, XIII**) . . . H (**V**) . . . H^{1} . . . Wr . . . Se . . . Ra (**XXIV**) . . . Δ (1209) . . . Δ (**I, II**) . . . Glasenapp (**III**) . . . *Annals Toulouse Obsy.* **III** . . . Espin (*Mon. Not.* **LXII**, 530) . . .]

(See p. 1084)

10927. A 762. With later measures (*Bul. L. O.* No. 61) the mean is:

1904.44	355°7	2″91	3*n*	A	8.1 . . . 14.3

10929. β 839. Discovered with the 15½-inch at the 16 10 Washburn Observatory. Without change.

A and B

1892.86	200°8	14″45	1*n*	Ho
1898.69	201.7	15.03	1*n*	β

A and C

1887.85	197°8	21″43	3*n*	Com
1892.86	195.4	21.20	1*n*	Ho
1898.69	197.1	21.67	1*n*	β

[β (**XII**) . . .: β^{4} . . . Com (**VI**) . . . Ho (3234) . . . β (*Pub. Y. O.* **I**) . . .]

(See p. 1084)

16^{m} 21^{s} **10930. Espin 137.** The only other measures are:

AB	1905.97	74°0	45″87	2*n*	Doo	6.7...
BC	1905.97	70.3	2.67	2*n*	Doo	9.3...12.3

[Espin (*Mon. Not.* **LXIII**, 172)...]

16 16 **10931. Ho 156.** Probably unchanged.

1895.70	47°0	1″72	1*n*	Ho	
1900.68	45.5	1.81	2*n*	A	7.0...13.0
1905.75	48.2	2.17	4*n*	Doo	7.4...12.4

[Ho (2779, 3558)...A (*Bul. L. O.* No. 11)...]

16 32 **10932.** 1 *Pegasi*. **Σ 11, App II.** (= **H** V. 20 = **S** 787 = **OΣ (App) 218.**) Without change. The proper motions are given:

A = 0″112 in 53°9 Auwers
0.112 in 51.8 Rechenberg
B = 0.072 in 48.2 Rechenberg

1851.89	311°1	36″35	1*n*	OΣ
1868.74	311.3	36.17	5*n*	Δ
1876.75	310.9	36.18	2*n*	OΣ
1887.65	311.7	36.12	2*n*	Eng
1892.63	311.2	36.66	4*n*	Gla
1905.43	311.2	35.84	3*n*	β

[Ra (**XXII**)... Pk... Δ (**II**)... OΣ (**X**)... Engelhardt (**II**)... Glasenapp (**III, IV**)... Franz (3464)...β^{6}...]

16 54 **10935.** θ^{2} *Microscopii.* **β 766.** Discovered with the 6-inch at Mt. Hamilton in 1879. Some change in the angle is very probable. All the other measures are given.

1886.71	302°0	....	1*n*	Pollock
1889.43	307.1	1″06	1*n*	β
1894.76	292.3	0.63	2*n*	Sellors
1896.81	281.7	0.94	3*n*	See
1896.81	286.1	0.86	1*n*	Cogshall
1897.79	272.7	0.98	1*n*	See
1898.71	293.4	1.08	2*n*	A
1900.76	292.3	0.96	2*n*	Innes
1901.85	287.8	Obl.	5*n*	Do

[β (**XI**)....β^{2}....β (2957)(*Pub. L. O.* **I, II**)....Pollock (*Pub. Sydney Obsy.* 1891) (*Mon. Not.* **XLVII**, 473)...Sellors (3303)...See (3496)... A (3585)... Do (3799) ...Innes (*Annals Cape Obsy.* **II**)...]

16 56 **10936. β** *Equulei.* (ACD = **H 3023.**) The nearest star, B, was added with the 18½-inch. The magnitudes of C and D from H. He gave the angles of AC, AE and CD, 314°4, 278°0 and 14°5 respectively. The only later measures are:

AB	1901.55	258°6	33″87	2*n*	β
AC	1901.59	306.0	68.49	1*n*	β
CD	1901.55	7.8	5.80	2*n*	β
AE	1901.59	275.3	93.49	1*n*	β

The proper motion of β *Equulei* is 0″023 in 66°7 (Auwers.)

[β^{1}...β^{5}...]

17 8 **10937. A 763.** Later measures (*Bul. L. O.* No. 61):

1904.53	213°8	1″08	3*n*	A	8.0	12.2

10938. OΣ 438. No change. These are all the other measures: 17^{m} 13^{s}

1867.49	358°1	2″34	4*n*	Δ
1897.64	353.6	2.82	1*n*	Gla
1898.67	356.7	2.20	3*n*	Hu

[OΣ (**IX**)... Δ (**I**)...Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

10939. β 1035. B. A. C. 7422. Discovered with the 12-inch. Apparently angular motion. 17 16

1888.74	198°7	1″05	3*n*	β	8.0...10.7
1898.72	205.6	1.21	1*n*	Cg	8.5...11.0
1898.74	207.0	1.09	3*n*	A	8.0...10.3

[β (**XIV**)...β (2875)(*Pub. L. O.* **II**)...A (3585)...Cogshall (*A. J.* 478)...]

10941. Espin 138. The only other position is: 17 18

1906.03	264°7	9″59	4*n*	Doo	6.8...12.7

[Espin (*Mon. Not.* **LXIII**, 172)...]

10943. S 788. (= σ **720.**) Only the following since 1824: 17 31

1900.47	88°0	44″29	2*n*	β^{5}	7.2...7.3

The components are Lalande 41562 and 41563. The change in distance is supported by the meridian positions, which give, Lalande 37″25 (1800) and Lamont 39″35 (1850).

10945. 18 *Aquarii.* **H 5517.** "A most minute point strongly suspected." Repeatedly looked for by me with various apertures. The nearest star with the 18½-inch is, 325°7 : 47″84(1877.82) 1*n*. The 40-inch in 1901 showed nothing nearer. The proper motion of 18 *Aquarii* is 0″070 in 88°4 (Auwers). 17 37

[β^{1}...β (*Mon. Not.* **XXXIV**, 380)...β^{5}...]

10946. Σ 2791. Very little, if any, change. 17 42

1866.03	105°2	2″46	3*n*	Δ
1892.76	107.3	2.33	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Se... Δ (**II**)...UL...Glasenapp (**II**)...]

10947. β 272. Discovered with the 6-inch. In the field with 18 *Aquarii.* The later measures show no motion. 17 50

1879.07	255°9	4″48	3*n*	Cin	8.1...12.0
1892.69	258.5	4.97	3*n*	Wilson	8.5...11.7
1899.09	256.0	4.68	7*n*	Doo	8.7... 9.9

[β (**V**)....β (*Mon. Not.* **XXXV**, 31).... Δ (**I**)....Cin^{5}....Cin^{6}....Wilson ( ).... Doolittle (*Pub. Flower Obsy.* **I**)...]

10948. Σ 2792. (= **H 1638**) Unchanged. The declination in H is 1° in error. 17 52

1866.30	329°9	7″13	3*n*	Δ
1894.58	330.7	7.35	2*n*	Gla
1905.43	331.1	6.95	2*n*	β

There is a third star, first noted with the 18½-inch:

1905.37	163°1	22″36	1*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**) ... Du... Δ (**II**)... β (*Mon. Not.* **XXXIV**, 380)... Glasenapp (**III**)...β^{6}...]

17^m 55^s **10949.** **Ho 157.** No motion.

1893.68	20°.7	3″.64	1*n*	Ho
1902.63	22.7	3.78	5*n*	Doo

[Ho (2779, 3234)...]

17 57 **10951.** **Σ 2796.** (= H IV. 103.) Distance slowly increasing.

1867.19	43°.4	25″.00	4*n*	Δ
1877.05	43.2	24.98	11*n*	Δ
1877.68	43.4	25.15	8*n*	Hl
1899.75	43.0	25.38	3*n*	Hu

The apparent annual motion of the companion is 0″.012 in the direction of A.

[Ma (*F. S.* **II**)...OΣ (X)...Δ (I, p. 410; II)... Hl (I, p. 22)... En (2662)...Glasenapp (IV)...*Annals Toulouse Obsy.* **III**...]

18 8 **10954.** **Ho 287.** The only later position is:

1905.74	189°.0	2″.02	4*n*	Doo	10.3...10.6

[Ho (2977)...]

18 13 **10955.** **Σ 2795.** Fixed.

1868.42	299°.5	1″.45	4*n*	Δ
1905.94	301.4	1.63	2*n*	Doo

[H (**IV**, **V**)...Ma (*F. S.* I)...Ma (XI)...Δ (II)...Glasenapp (III)...]

18 26 **10956.** **H 282.** The only measure is

1905.55	71°.9	23″.88	2*n*	β^6	8.6...13.0

18 33 **10958.** **Howe 56.** Discovered at the Cincinnati Observatory. (See No. 10976).

1883.40	144°.4	8″.60	4*n*	Wilson

[Cin^6...Wilson (Cin^{10})...]

18 34 **10959.** **H 1641.** The principal star has a proper motion of 0″.111 in 79°.7 (*A. G. Berlin*). The only measure is:

1902.85	312°.7	51″.83	3*n*	β^6	6.5...11.3

18 37 **10961.** **H 3027.** The only observation since H is the following:

1905.94	122°.7	33″.88	2*n*	Doo	9.0...9.0

18 46 **10962.** **β 447.** *Vulpeculae* 129. Discovered with the 18½-inch. Fixed. Lalande 41637.

1881.67	331°.1	9″.14	1*n*	Ho
1885.66	329.9	8.62	2*n*	HΣ
1892.80	330.7	9.41	1*n*	Ho
1898.63	330.2	8.74	3*n*	Boothroyd
1898.73	328.3	8.91	3*n*	A
1900.99	329.8	8.72	5*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β^1...Ho (2978, 3234)...Boothroyd (*A. J.* 478)...A (3585)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**, **II**)...]

10964. **A 764.** With later measures (*Bul. L. O.* No. 61) the mean is: 18^m 50^s

1904.48	254°.4	0″.41	3*n*	A	8.0...9.2

10965. **Ho 158.** The later measures are: 18 51

1895.23	348°.9	0″.98	2*n*	Ho	
1899.71	350.8	1.49	3*n*	Hu	9.0...9.5

[Ho (2779, 3558)...Hu (*Bul. L. O.* No. 44)...]

10966. **Σ 55, App I.** *Cygni* 332, 334. Without change. 18 57

1869.71	302°.7	365″.60	6*n*	Δ
1889.66	303.0	365.36	1*n*	Gla
1891.62	302.6	364.31	3*n*	Mai

[Ra (**XXVI**)...Δ (II)...Je (2343)...Maiebckato (*Obsns.* 1892)...Glasenapp (III)...]

10968. **H 5269.** Probably fixed. The following are all the measures: 19 13

1878.28	338°.2	8″.57	2*n*	Cin	8.5...8.5
1897.83	339.0	8.92	1*n*	See	8.3...9.5
1904.82	340.2	8.49	1*n*	β	9.0...9.0

[Cin^4...Cin^5...See (3496)...β^6...]

10969. **β 164.** (AC = Σ 2793.) The principal star of the wide pair, Σ 2793, was found to be a close pair with the 6-inch. The change, if any, is very slow. The distant star is fixed. 19 13

A and B

1874.40	244°.8	0″.64	1*n*	Newcomb
1877.72	237.3	0.82	1*n*	β
1878.60	62.6	0.59	1*n*	OΣ
1886.69	63.0	0.78	6*n*	HΣ
1886.78	237.6	0.68	2*n*	LM
1890.69	240.2	0.50	3*n*	β
1891.79	240.0	0.57	4*n*	T
1895.70	244.4	0.53	3*n*	Coleman
1898.68	238.0	0.70	3*n*	A
1901.66	244.2	0.72	3*n*	Doo

AB and C (= Σ 2793)

1828.80	242°.2	26″.51	3*n*	Σ
1865.14	241.2	26.62	3*n*	Δ
1890.69	241.5	26.99	3*n*	β
1892.81	243.0	26.66	2*n*	Gla
1895.70	240.8	26.86	5*n*	Coleman
1898.68	241.8	26.69	3*n*	A
1901.59	241.3	26.58	1*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^1...β (3048)(*Pub. L. O.* **II**)... Newcomb (*Wash. Obsns.* 1874)...Δ (II, p. 511)...Δ (2086)...LM...OΣ (X)...T (3186)... HΣ (**XII**)....A (3585)....Glasenapp (II).... Ma (*F. S.* I).... Coleman (*Mem. R. A. S.* **LIII**).... Do (3681) .... *Annals Toulouse Obsy.* **III**.... Lohse (*Pub. Potsdam Obsy.*)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

10970. **β 767.** Discovered with the 6-inch at Mt. Hamilton in 1879. In Cord. G. C. 6m. All the later measures are given. Probably no change. 19 19

1887.43	143°.9	3″.22	4*n*	Pollock	6 ... 8
1890.94	142.6	2.73	5*n*	Sellors	6 ... 8
1898.66	144.1	3.18	3*n*	A	6.0...10.0
1898.72	145.6	3.07	2*n*	Cogshall	6.5...11.5
1903.72	140.1	2.30	2*n*	Scott	5.8... 9

[β (XI) . . . β^{2}. . . Pollock (*Pub. Sydney Obsy.* 1891)(*Mon. Not.* **XLVII**, 473)(*Mem. R. A. S.* L). . . Sellors (3154). . . A (3585). . . Cogshall (*A. J.* 478). . . Scott (*Mon. Not.* **LXIV**, 57). . .]

$19^{m}\ 25^{s}$ **10971.** OΣ 439. (= H 3026.) No change.

1866.96	219°.7	15″.53	3*n*	Δ
1898.46	220.9	15.32	3*n*	Hu

[Ma (XIII). . . OΣ (IX) . . . Δ (I). . . Glasenapp (IV). . . Hu (*Pub. L. O.* **V**). . . Lohse (*Pub. Potsdam Obsy.*). . .]

19 25 **10972.** Hn 44. The only other measure is:

1888.11	267°.9	2″.52	3*n*	Com

[β^{4}. . . Com (VI). . .]

19 31 **10973.** A 765. With later measures (*Bul. L. O.* No. 61) the means are:

		A and B			
1904.44	42°.1	0″.33	3*n*	A	7.2 . . . 8.3
		C and D			
1904.44	330°.4	6″.40	2*n*	A	14.2 . . . 14.7
		AB and C			
1904.44	25°.3	25″.74	2*n*	A	

19 39 **10975.** Hn 166. From *Pub. Washburn Obsy.* II. Not found by Com (VI) in 1888.

19 48 **10976.** Hd 165. The description in the *Harvard Observations* is 137° : 10″± : 8½ . . . 11 (1868.82). There certainly is no such pair in or anywhere near this place. I looked for it in 1876, and again with the 40-inch in 1901. It may be identical with a Cincinnati pair, having about the same R. A., but 8° north of the Hd place. The description agrees, 142°.9 : 8″.22 : 8 . . . 10 (1879.54). (See No. 10958.)

[β^{5}. . .]

19 49 **10977.** *ζ Capricorni.* See 446. The later measures are:

1899.01	13°.8	21″.51	3*n*	Bd	. . . 12.3
1900.38	12.1	21.12	2*n*	Doo	. . . 12.7

The proper motion is very small and uncertain.

[See (*A. J.* 431). . . Boothroyd (*A. J.* 486). . . Doolittle (*Pub. Flower Obsy.* I). . .]

20 43 **10979.** H 5271. "Pos. unsatisfactory." Distance much under estimated.

1901.78	45°.8	6″.47	2*n*	β^{5}	10.6 . . . 11.6

20 43 **10980.** β 683. Discovered with the 18½-inch. While the relative change is small, the components have a common proper motion of 0″.125 in 154°.7 (Porter), and therefore probably form a physical system. All the other measures are given.

1879.79	197°.3	2″.5±	1*n*	Cin
1882.71	193.1	1±	1*n*	W
1892.79	193.2	2.89	1*n*	Ho
1898.69	194.6	2.67	2*n*	Bd
1898.71	195.1	3.01	3*n*	A

[β (X). . . . β^{1}. . . . Cin^{6}. . . . Wilson (Cin^{10}). . . . Ho (3234). . . . Boothroyd (*A. J.* 478). . . . A (3585). . .]

10983. 69 *Cygni.* S 790. (= H V. 44 = σ 722.) The identity of the star observed by Herschel and South is somewhat uncertain. In both catalogues it is called 69 *Cygni.* Herschel's description is, "treble; very unequal. Position preceding." In South it is called "excessively difficult," but the separate results are in close agreement. The proper motion is too small to account for any considerable change in the position of the small star. This according to Auwers is only 0″.023 in 247°.6. I did not find in the immediate vicinity any pair like S 790. $20^{m}53^{s}$

The following are all the measures of 69 *Cygni*:

		A and B			
1896.61	30°.2	32″.87	2*n*	Lv	. . . 10.5
1896.62	30.0	33.70	2*n*	Soulé	. . . 10.2
1900.76	30.7	32.60	3*n*	Es	. . . 11.7
1903.30	30.4	33.05	3*n*	β	. . . 11.5
		A and C			
1896.61	98°.2	53″.90	2*n*	Lv	. . . 9.1
1896.62	97.7	54.04	4*n*	Soulé	
1900.80	98.5	53.63	2*n*	Es	
1903.30	97.8	53.96	3*n*	β	. . . 10.1

[Lv (*A. J.* 407). . . Soulé (*A. J.* 410). . . Espin (3717). . . β^{6}. . .]

10985. Σ 2797. (= S 789.) No evidence of motion, but Struve's angle seems to be too small. There is no change in the last forty years. 20 56

1866.95	217°.2	3″.32	3*n*	Δ
1868.94	216.3	3.28	5*n*	Du
1887.06	215.0	3.35	3*n*	HΣ
1887.84	218.2	3.34	2*n*	Hl
1902.81	217.6	3.14	2*n*	Do
1903.83	217.1	3.16	2*n*	Bowyer

[Ma (*F. S.* I). . . Ma (**X, XIII, XV**). . . H^{1}. . . Bp. . . Da^{1}. . . Se. . . Wr. . . Ra (**XXIV**). . . H (IV). . . Du. . . Flm. . . Δ (1209). . . Δ (I, II). . . Hl (II). . . Maw (I, IV). . . Glasenapp (III). . . Collins (*A. J.* 378). . . Knorre (3300, 3632). . . Coleman (*Mem. R. A. S.* **LIII**). . . Do (3681, 3931). . . *Annals Toulouse Obsy.* **III**. . . HΣ (XII). . . Greenwich Obsy. (*Mon. Not.* **LXIV**, 805; **LXVI**, 31). . .]

10986. Σ 2798. No change since Struve. 21 2

1868.32	146°.3	6″.35	4*n*	Δ
1894.62	144.9	6.46	2*n*	Gla
1905.75	145.9	6.44	1*n*	β

[Ma (*F. S.* I). . . Ma (XI). . . H (IV). . . Δ (II). . . Glasenapp (III). . . β^{6}. . .]

10989. Schj. 28. Discovered by Schjellerup. No motion. 21 22

1886.69	133°.7	3″.06	3*n*	LM
1891.77	133.4	2.92	2*n*	Collins
1903.73	133.0	2.85	2*n*	Scott

[Schj (1485). . . Δ (I). . . Cin^{5}. . . LM. . . Collins (*Proc. Haverford Coll. Obsy.* 1891) . . . Scott (*Mon. Not.* **LXIV**, 52). . .]

21^{m} 24^{s} **10990.** **A 766.** With another measure (*Bul. L. O.* No. 61):

1904.48	204°3	0″52	3*n*	A	9.0...10.5

21 26 **10991.** **H 935.** Place taken from H (III). In the notes to Herschel's General Catalogue (*Mem. R. A. S.* XL, 143) it is stated that H's two observations of this pair differ 1° in declination, and therefore it is uncertain whether it is 33° or 34°. In 1876 I looked for it in both places, but did not succeed in identifying it.

21 53 **10993.** **Ho 159.** Unchanged.

1895.76	188°2	5″59	2*n*	Ho	
1905.75	189.9	6.31	4*n*	Doo	8.7...12.7

[Ho (2779, 3558)...]

22 4 **10994.** **Σ 2801.** Relatively fixed, but common proper motion of 0″181 in the direction of 67°2 (Bossert).

1869.44	273°8	1″55	4*n*	Δ
1876.67	271.5	1.54	17*n*	Δ
1878.62	272.5	1.66	12*n*	Hl
1891.99	272.2	2.72	15*n*	Com
1901.38	272.1	1.77	3*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...OΣ (**IX, X**)...Se...Δ (1195)...Δ (I, pp. 99, 398; **II**)...Kustner (2584)....En (2662)....de Ball (3017)....Flm....Flm (*Ast. Reg.* Sept. 1877)....Hl (I, p. 22; **II**)....Cin[5]....Glasenapp (**III**)....Collins (*A. J.* 378)....Com (**VI, X**)...Lau (4078)...]

22 6 **10995.** **β 1141.** Discovered with the 36-inch. The only other position is:

1898.68	171°9	3″13	3*n*	A	7.5...13.8

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...]

22 31 **10997.** **β 369.** Discovered with the 6-inch. The 36-inch shows a third star 14m, a little farther from A than this, in the direction of 330°. The other measures are:

1885.55	33°4	16″03	1*n*	HΣ
1899.71	31.8	16.35	3*n*	Doo
1905.78	31.5	16.07	2*n*	β

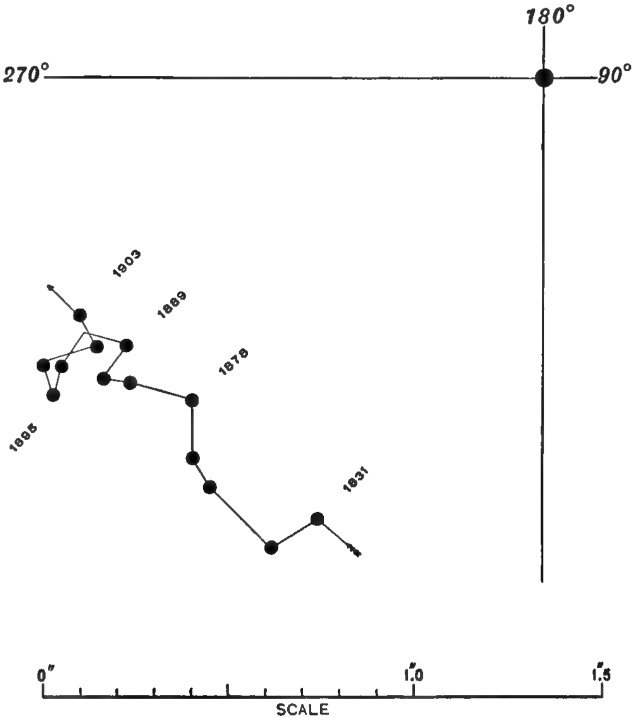
The 14m star not seen. A 12m star measured:

1905.78	62°8	50″83	1*n*	β

[β (**VI**)....β (2062, 3114)(*Pub. L. O.* **II**)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy.* I)...β[6]...]

23 2 **11001.** **Σ 2799.** *Pegasi* **20.** (= **S 791.**) The motion so far is apparently rectilinear, and indicates a proper motion in one of the components of about 0″01 annually. The position-angle is reversed in many of the observations.

1831.82	332°9	1″35	6*n*	Σ
1843.75	329.8	1.48	2*n*	OΣ
1853.20	320.8	1.44	2*n*	OΣ
1863.81	317.4	1.41	7*n*	Δ
1878.71	312.6	1.30	2*n*	Hl
1885.71	306.5	1.40	3*n*	Hl
1889.02	304.5	1.45	13*n*	HΣ
1889.94	302°9	1″35	3*n*	Maw
1893.80	301.0	1.53	2*n*	Big
1895.71	303.0	1.59	2*n*	Collins
1896.51	300.0	1.57	3*n*	Lv
1897.89	301.2	1.42	3*n*	Hu
1903.56	297.0	1.37	2*n*	Biesbroeck
1903.74	297.3	1.47	6*n*	Bowyer



Σ 2799.

[Ma (*F. S.* **I**)...Ma (**IX, X, XIII, XV**)...H[1]...Wr...Bp...Da[1]...Da[2]...Da[3]...Se...Se[2]...Se[3]...Se (1017)...Bru...Bru[2]...Ba (**II, III, IV**)...Hd...Pl...Flm...Giacomelli (**III**)...OΣ (**IX**)...Δ (1118, 1475)...Δ (**I, II**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 2242, 2303, 3681)...Gl...WS...WS[2]...Sk...UL...de Ball (2753)...En (2678)...T (2899)...Lv[1]...Hl (**I, II**)...Hl (*Wash. Obsns.* 1884–85)...Maw (**I, II**)...Glasenapp (**II, III**)...Big (*Bul. Ast.* **XII**, 299)...Sk[4]...Collins (*A. J.* 378)...Lv (*A. J.* 407)...Soulé (*A. J.* 410)...Hu (*A. J.* 427)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805)....Maw (**III**)....Coleman (*Mem. R. A. S.* **LIII**)...Solá (3679)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Kustner (3821)...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...]

11003. **Ho 160.** Apparently unchanged. 23^{m} 26^{s}

1895.74	173°6	1″83	3*n*	Ho	8.3...8.7
1905.79	174.4	2.03	4*n*	Doo	8.4...9.0

[Ho (2779, 3558)...]

11004. **See 448.** A later measure is: 23 29

1899.52	250°3	1″42	3*n*	Cg	8.0...12.2

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11005. **H 1647.** Nothing since H but the following: 23 30

AB	1905.45	177°4	40″97	2*n*	β^{6}	...10.6
AC	1905.45	125.6	41.34	2*n*	β^{6}	...11.7

$23^{m}\ 43^{s}$ **11006.** **β** 72. Discovered with the 6-inch. *β Aquarii* is 11′ *n*, and *β* 684 in the field. Change uncertain. The other measures are:

1878.17	43°1	1″90	2*n*	*β*
1878.75	37.0	1.74	2*n*	Cin
1886.68	38.0	2.00	4*n*	LM
1890.68	42.2	1.84	3*n*	*β*
1890.77	44.1	1.94	2*n*	T
1897.74	37.6	1.89	3*n*	A
1900.80	38.6	1.84	3*n*	Doo

[*β* (I)....*β* (*Mon. Not.* **XXXIII**, 351)....β^{1}....*β* (3048)(*Pub. L. O.* **II**)....Δ (I)....Cin^{5}....LM....T (3186)....A (*A. J.* 429)....Brown (3646).... Doolittle (*Pub. Flower Obsy.* I)...]

23 53 **11007.** **β** 684. Discovered with the 18½-inch. In the field with *β* 72. Angular motion is probable.

1878.62	133°9	1″11	1*n*	*β*	9.0...9.2
1886.78	126.1	1.16	2*n*	LM	9.4...9.8
1890.68	126.7	1.12	3*n*	*β*	8.7...8.9
1897.75	124.8	1.16	3*n*	A	
1901.65	123.6	1.05	3*n*	Doo	9.1...9.5

[*β* (X)...β^{1}...*β* (3048)(*Pub. L. O.* II)...A (*A. J.* 429)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* II)...]

24 4 **11010.** **Σ** 2807. Change in distance?

1866.60	317°2	2″31	3*n*	Δ
1893.61	317.7	2.45	2*n*	Gla
1906.05	315.1	2.01	4*n*	Doo

[Ma (*F. S.* I)...Ma (XI)...H^{1}...Ra (**XXV**)... Δ (1195)... Δ (I, II)... Big... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (III)...*Annals Toulouse Obsy.* III...]

24 6 **11011.** **OΣ** 440. (= **H** 1650.) B. A. C. 7476. No material change.

1866.64	189°6	12″15	3*n*	Δ
1895.77	186.8	11.90	2*n*	Gla
1898.66	184.8	11.89	3*n*	Hu

[OΣ (IX)...Δ (I)...Glasenapp (IV)...Hu (*Pub. L. O.* V)...]

24 31 **11013.** **Σ** 2800. Fixed.

1867.85	256°0	8″94	4*n*	Δ
1894.70	255.9	9.09	2*n*	Gla
1903.38	255.2	9.20	2*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...H (IV)...Δ (II)...Glasenapp (III)...]

24 31 **11014.** 2 *Pegasi.* **β** 685. Discovered with the 18½-inch. The principal star has a proper motion of 0″015 in the direction of 82°5 (Auwers).

1893.68	332°4	29″58	1*n*	Wilson
1899.72	332.3	30.28	3*n*	Doo

[*β* (X)...β^{1}...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

24 36 **11017.** **β** 448. A double star, supposed to be in this place, was found with the 18½-inch October 1876, and the distance estimated 2″, and the magnitudes 7 and 11. I could not see this star double with the 18½-inch in 1879, nor with the 36-inch in 1891. HΣ found it single in 1885, and Doolittle in 1901–3. The 40-inch showed no companion in 1902. There is no obvious error in the original entry, nor any doubt noted as to the existence of the companion. The magnitude of this star is 6.4 in *A. G. Bonn.*

[*β* (IX)... *β* (*Mon. Not.* **XXXVIII**, 78)... β^{3}... HΣ (XII)... β^{6}... Doolittle (*Pub. Flower Obsy.* II)...]

11019. **See** 449. A later position is: $24^{m}\ 41^{s}$

1899.69	200°8	1″87	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11020. **Espin** 99. The only other measure is: 24 43

1902.63	206°0	5″40	2*n*	*β*	9.2...11.7

[Espin (3784)...β^{6}...]

11022. **β** 1142. Discovered with the 36-inch. The other measures give a larger angle: 25 7

1898.80	356°6	0″44	3*n*	A	9.3...9.3
1901.78	362.7	0.53	2*n*	Doo	9.6...9.6

[*β* (XVI)....*β* (2956)(*Pub. L. O.* II)....A (3585).... Doolittle (*Pub. Flower Obsy.* II)...]

11025. **Schj.** 29. The only measure of this wide pair noted by Schjellerup is the following: 25 11

1905.56	293°6	58″97	1*n*	β^{6}	9.0...9.1

11026. **β** *Aquarii.* **β** 73. (AB = H V. 76 = σ 723 = **H** 936.) The faint companion was noted with the 6-inch. All the other measures of the Herschel star are given. These companions are not likely to have any connection with the large star. The proper motion is very small, 0″009 in the direction of 263°6. 25 14

A and C

1893.82	185°0	54″95	3*n*	W
1898.63	184.6	55.97	3*n*	Cogshall
1898.90	185.4	55.73	1*n*	*β*

A and B (= H 936)

1828	322°8	20″ ±	1*n*	H
1893.82	318.5	34.92	3*n*	W
1898.63	318.4	34.96	3*n*	Cogshall
1898.90	319.1	34.72	1*n*	*β*

[*β* (I).... *β* (*Mon. Not.* **XXXIII**, 351) .... β^{1}.... β^{3} ....Wilson ( ).... Cogshall (*A. J.* 478)...]

11027. **A** 767. With other measures (*Bul. L. O.* No. 61) the mean is: 25 18

1904.48	177°0	1″12	3*n*	A	8.8...11.7

11028. **Hn** 45. The angle is reversed by the later observers: 25 21

1882.68	197°0	1″12	2*n*	Ho	8.3...8.5
1888.76	199.8	1.42	3*n*	Com	9.1...9.6

[β^{4}...Com (VI)...Ho (2978)...]

25m 27s **11029.** **H 3031.** "Forming with four more ⅔ of an ellipse."

25 33 **11030.** **H 1654.** "Duplex" in O. Arg. N.

1902.99	30°.8	3″.98	3*n*	Es	9.1...9.3

[Espin (*Mon. Not.* **LXIV**, 679)...]

25 54 **11032.** **Σ̄ 2803.** Very slow change from proper motion. This is given from meridian positions, 0″.014 in 270° (*A. G. Harvard*).

1832.16	290°.2	23″.23	4*n*	Σ
1867.33	289.1	23.88	4*n*	Δ
1895.77	288.3	24.59	2*n*	Gla
1902.45	287.8	24.54	3*n*	Hu

The foregoing measures give the proper motion of A in the opposite direction, 0″.024 in 74°.6.

[Ma (**X**)....Ma (*F. S.* **I**)....Δ (**II**)....Glasenapp (**IV**)....*Annals Toulouse Obsy.* **III**...]

(See p. 1084)

25 55 **11033.** **OΣ 441.** No change since 1847.

1867.47	322°.3	6″.68	4*n*	Δ
1898.67	322.9	6.81	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

26 5 **11034.** **A 768.** With another measure (*Bul. L. O.* No. 61) the mean is:

1904.43	333°.4	0″.60	3*n*	A	9.1...9.7

26 25 **11036.** **A 769.** With other measures (*Bul. L. O.* No. 61) the mean is:

1904.48	284°.0	0″.72	3*n*	A	8.3...8.8

26 29 **11038.** **A 770.** With later measures (*Bul. L. O.* No. 61) the mean is:

1904.48	329°.8	1″.75	3*n*	A	8.3...10.7

26 31 **11039.** **H 3032.** "Difficult, and measures bad." The only later observation is:

1903.57	93°.4	17″.27	2*n*	β6	8.1...12.8

26 37 **11040.** **Ho 161.** No motion.

1895.70	356°.6	2″.78	4*n*	Ho
1901.90	359.0	3.00	7*n*	Doo

[Ho (2779, 3558)...]

11042. **Σ 2802.** (= **S** 792.) Unchanged. 26m 45s

1865.88	9°.2	3″.74	4*n*	Δ
1889.55	8.7	3.85	1*n*	Gla
1902.45	9.1	3.82	3*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Da1....Se....Ra (**XXIV**)....H (**VII**)...Du....Δ (1209)...Δ (**I, II**)...Sk2...Big...Glasenapp (**III**)...Collins (*A. J.* 378)...Knorre (3518)...*Annals Toulouse Obsy.* **III**....Thiele (3837)...Lewis (*Mon. Not.* **LXVI**, 31)...Lau (4078)...]

11045. **Ho 603.** The only other measures are: 27 1

BC	1902.73	272°.6	3″.41	3*n*	Doo
AB	1902.70	251.6	81.09	1*n*	Doo

[Ho (3558)...]

11046. **β** *Cephei.* **Σ 2806.** (= **H III. 6** = **Sh 330.**) Fixed. The components have a small common proper motion: 27 6

Auwers	0″.008 in 149°.7
A. G. Chris.	0.013 in 152.9

The principal star is a spectroscopic binary, discovered at the Yerkes Observatory by Frost and Adams.

1876.78	250°.4	13″.67	3*n*	OΣ
1877.11	250.4	13.45	21*n*	Δ
1878.12	250.6	13.52	10*n*	Hl
1899.77	249.5	13.55	2*n*	Hu
1905.85	250.1	13.27	3*n*	β

[Ma (*F. S.* **I**)...Ma (**IX, XI, XIII**)...H (**IV, V**)...Ek (**I**)...K (409)...Bes...Wr...Wh...WJ...*Gr. Obsns.* 1840...Peters (1042)...Auwers (1393)...Lu (**II, III**)...Ba (**II**)...Δ (1032, 1209)...Δ (*Mem. Accad. Sci.*)...Δ (**I**, pp. 99, 407; **II**)...OΣ (**X**)...Du...Pk...WS...Gl...Hl (*Wash. Obsns.* 1876)...Hl (**I**, p. 23)...Cin5....Je (2407)....Franz (2590).... de Ball (3017).... Glasenapp (**I, III**)....En (2662)...Cohn (3240)...Espin (*Brit. Ast. Ass'n* **III**, 228)...Chofardet (3450)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Lau (4078)...Frost and Adams (*Astrophysical Jour.* **XV**, 340)...β6...]

11048. **A. G. 272.** Double in *A. G. Bonn.* Measures by Espin (*Mon. Not.* LXIV, 680). 27 8

11050. **A 771.** With two later measures (*Bul. L. O.* No. 61) the mean is: 27 11

1904.48	68°.3	0″.29	3*n*	A	7.7...7.9

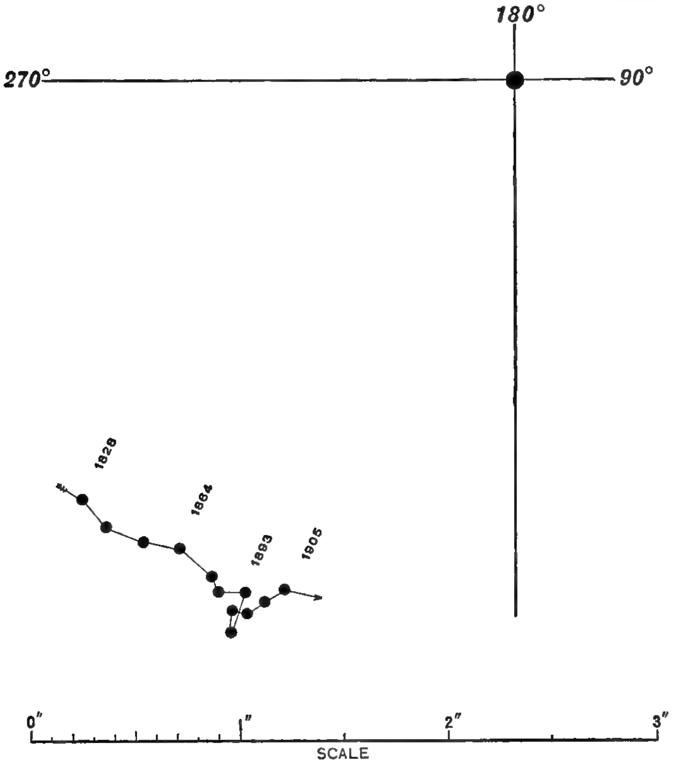
11051. **Σ 2804.** *Pegasi* 29. (= **S 793.**) The motion is apparently rectilinear, and one of the components must have a proper motion of about 0″.014. 27 26

The following measures are shown on the diagram:

1828.75	314°.4	2″.93	2*n*	Σ
1841.44	317.8	2.94	4*n*	Da
1854.00	321.3	2.89	4*n*	Da
1864.87	324.5	2.80	6*n*	Δ
1878.77	328.7	2.83	2*n*	Hl
1886.73	330.6	2.84	2*n*	Hl
1887.05	329.4	2.91	3*n*	HΣ

1893.64	332°3	2″81	2*n*	Gla
1896.72	332.8	3.01	4*n*	Hu
1901.59	332.1	2.91	7*n*	Bowyer
1902.81	333.4	2.90	2*n*	Do
1903.97	334.4	2.81	6*n*	Bowyer
1905.79	335.7	2.71	1*n*	β

[Ma (*F. S.* I)...Ma (**IX, X, XI, XIII, XV**)...H^1...H^2...Wr...Bp...Da^1...Da^2...Da^3...Se...Se^2...Se^3...Ra (**XXIV**)...Bru...Bru^2...Du...Pl...Ba (**II, IV**)...Flm...Newcomb (*Wash. Obsns.* 1867)...WS...WS^2...Kn...Gl...Sk...Δ (*Mem. Accad. Sci.*)...Δ (1032, 1209, 1573)...Δ (**I, II**)...OΣ (**IX**)...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 3931)...Sp (2133)...Sp (**II**)...Per...Per (2559)...En (2678)...Giacomelli (**III**)...de Ball (2753)...T (2991)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (**I, II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)....Jones (*A. J.* 312)....Maw (**II**)....Glasenapp (**III**)....Collins (*A. J.* 378)...Hu (*A. J.* 397)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Sk^5...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805; **LXVI**, 31)....Lohse (*Pub. Potsdam Obsy.*)...β^6...]



Σ 2804.

$27^m\ 36^s$ **11053.** **Ho 162.** Unchanged.

1902.64	328°8	3″29	4*n*	Doo

[Ho (2779)...]

27 51 **11054.** **Ho 288.** The only later position is:

1897.07	280°9	17″86	3*n*	Ho

[Ho (2977, 3558)...] (See p. 1084)

27 52 **11055.** **Ho 604.** A later measure:

1902.15	314°5	5″06	6*n*	Doo

[Ho (3558)...]

11056. **β 165.** (= **Hd 166.**) Discovered with the 6-inch. No description in Hd, but probably identical. No change. $27^m\ 55^s$

1879.29	176°7	4″82	2*n*	Cin
1888.82	176.5	5.04	1*n*	Lv
1890.77	179.3	4.96	1*n*	Byers
1890.77	174.3	4.42	2*n*	T
1898.51	176.5	5.08	4*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Δ (**I**)....Cin^5....Cin^6....Lv^1....Byers (*Proc. Haverford Coll. Obsy.* 1891)....T (3186)....Doolittle (*Pub. Flower Obsy.* **I**)...]

11058. **β 370.** Discovered with the 6-inch. The proper motion is 0″045 in 90° (*A. G. Harvard*). The other measures show no change. 28 15

1880.82	325°5	3″59	1*n*	Pt
1892.77	328.0	3.69	4*n*	W
1898.60	326.7	3.68	4*n*	Doo

[β (**VI**)...β (2062)...Δ (**I**)...Pt...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

11059. **A 296.** No other measures. 28 17

[A (3784)(*Bul. L. O.* No. 16)...]

11060. **β 273.** Discovered with the 9.4-inch at the Dartmouth College Observatory. Unchanged. 28 33

1879.97	92°4	5″54	3*n*	β	8.0...11.5
1898.50	90.9	6.13	3*n*	Doo	8.7...10.5
1898.84	92.9	5.73	1*n*	β	8.0...10.5

[β (**V**)...β (*Mon. Not.* **XXXV**, 31) (*Pub. Y. O.* **I**)...β^1...β^3...Δ (**I**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11061. **Σ 3112.** (= **OΣ 528.**) No change since 1831. 28 36

1852.02	239°1	7″08	3*n*	OΣ
1868.48	239.4	7.00	7*n*	Δ
1898.62	239.5	7.29	3*n*	Hu

[H^2...H (**V**)...Ma (*F. S.* **I**)...Ma (**X**)...Se...OΣ (**IX**)...Δ (**II**)...β (2033)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...Hu (*Pub. L. O.* **V**)...]

11062. **Innes 380.** (= **Hu 965.**) The only other measure: 28 51

1904.75	356°8	1″49	2*n*	Hu	8.3...9.0

[Innes (*Mon. Not.* **LXI**, 609)...Hu (*Bul. L. O.* No. 74)...]

(See No. 13580)

11065. **H 1659.** Nothing since Herschel but the following: 29 18

1900.62	300°4	6″68	1*n*	Es	8.4...9.0
1905.75	301.2	7.12	1*n*	β	

There is a 14m star, 71°3 : 21″3.

[Espin (*Mon. Not.* **LXIV**, 679)...β^6...]

11066. **Lassell.** A double-triple star noted by Lassell (*Mon. Not.* XVII, 66), the three principal stars forming a right-angled triangle, each having a minute companion, 11–12m. The only measures are those given in Part I from β^6. The principal star is DM (31°) 4498. There is a 13.5m companion nearer A, 339° : 11″. 29 35

$29^m\ 40^s$ **11068.** **β 74.** Discovered with the 6-inch. No relative motion.

1874.67	321°4	1″54	1*n*	OΣ
1884.38	321.7	1.62	3*n*	HΣ
1893.53	319.9	1.32	3*n*	Lv
1902.90	321.9	1.59	8*n*	Doo

[β (I)....β (*Mon. Not.* **XXXIII**, 351)....OΣ (**X**)....Δ (I)....Perry (*Eng. Mech.* **XXXVI**, 65)....Lv (*A. J.* 382)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy.* **II**)...]

29 49 **11069.** **H 3039.** "Very fine."

1879.63	154°4	11″23	2*n*	Cin^5	9.0...10.0

(See p. 1084)

30 4 **11074.** **Ħ V. 28.** No measures in Ħ; given as "near *β Cephei*." Identified and measured. C is DM (70°) 1179.

AB	1904.53	339°7	78″68	2*n*	β^6	9.1...9.8
AC	1904.53	170.4	130.58	2*n*	β^6	...9.2

30 7 **11075.** **Hu 771.** With two later measures (*Bul. L. O.* No. 65) the mean is:

1904.55	195°0	2″58	3*n*	Hu	7.2...11.5

(See p. 1084)

30 17 **11076.** **β 166.** Discovered with the 6-inch. Distance increasing?

1875.54	259°3	1″16	4*n*	Δ
1885.52	254.1	1.31	2*n*	HΣ
1893.77	256.6	1.44	2*n*	Wilson
1898.57	256.9	1.46	3*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Δ (I)....Wilson ( )....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy.* I)...]

30 22 **11077.** ϵ *Capricorni.* **H 3040.** (= **Ħ VI. 6.**) No measures by Ħ. The proper motion is very small, 0″013 in 256°7 (Auwers). No material change. The companion is SD (20°) 6253.

1881.67	47°5	68″68	3*n*	β	
1896.64	47.9	68.40	3*n*	Lv	6.0...9.0
1903.72	47.3	68.30	3*n*	β	...9.5

The principal star is a spectroscopic binary, Slipher (*Bul. Lowell Obsy.* No 11).

[Cin^4...β1...β^4...Lv (*A. J.* 407)...β^6...]

30 30 **11079.** **H 938.** H (V) 166°0 : 20″: 8...15. In DM 8.2m

30 30 **11080.** **H 5282.** Measures from H^3. Nothing since 1836 but the following:

A and B

1879.63	84°8	16″47	1*n*	Cin^5	8.5... 8.7
1903.57	87.0	17.38	2*n*	β^6	9.5... 9.6

B and C

1879.63	26°2	29″02	1*n*	Cin^5	...10.0
1903.57	23.5	28.88	2*n*	β^6	...10.2

B is SD (17°) 6325. The magnitudes of A and B in SD are 9.5 and 9.2.

11081. **H 939.** (AC = Σ 2808 *rej.*) The wide pair is one of the Σ rejected numbers, each star having a faint companion. $30^m\ 34^s$

A and B

1900.71	172°7	14″81	1*n*	Es	8.0...12.0
1903.58	173.8	15.01	2*n*	β	8.4...11.2

C and D

1903.58	343°7	15″27	2*n*	β	10.6...12.5

A and C

1879.61	290°6	41″29	1*n*	Cin	7.5...10.0
1900.71	290.6	40.72	1*n*	Es	8.0...10.0
1903.58	289.6	40.70	2*n*	β	8.0...10.6

[Cin^5....Espin (*Mon. Not.* **LXIV**, 679, 680)....Lewis (*Mon. Not.* **LXIV**, 805)....β^6...]

11082. **H 940.** In the field with the preceding pair. Measures from Cin. No measures in H. 30 34

1900.71	321°6	19″12	1*n*	Es	
1903.58	322.3	19.16	2*n*	β	10.0...10.3

Cin^5...Espin (*Mon. Not.* **LXIV**, 680)...β^6...]

11084. **OΣ 442.** The change, if any, is very slow. All the measures are given. 30 45

1847.77	10°8	0″59	3*n*	OΣ
1870.11	3.7	0.58	1*n*	Δ
1894.62	359.1	0.55±	2*n*	Gla
1898.62	360.9	0.67	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

(See p. 1084)

11085. **Ho 163.** Probably no change. 30 48

1895.73	40°2	7″08	3*n*	Ho
1903.68	42.6	6.64	1*n*	Lewis
1904.66	38.5	7.23	3*n*	Doo

[Ho (2779, 3558)...Lewis (*Mon. Not.* **LXIV**, 805)...]

11086. **H 1664.** The only measure is: 30 49

1905.30	88°1	7″68	2*n*	Es	9.7...9.7

[Espin (*Mon. Not.* **LXVI**, 143)...]

11087. **H 5284.** Measures from H^3. B is SD (16°) 5898. The magnitudes in SD are 8.8 and 9.5. The apparent change in the distance needs confirmation. 30 52

1879.63	268°5	48″68	1*n*	Cin^5	8.0...10.0
1903.57	269.0	49.51	3*n*	β^6	9.0... 9.8

11088. **β 167.** *Cygni* 363. P XXI. 215. Discovered with the 6-inch. Without change. The following are all the other measures: 31 0

1881.73	88°0	1″97	3*n*	Ho
1882.68	91.0	2.17	1*n*	Perry
1885.66	92.2	2.33	2*n*	HΣ
1893.66	88.9	2.19	2*n*	Wilson
1903.51	87.8	2.34	3*n*	Doo
1904.21	91.3	1.92	2*n*	Lewis
1904.49	88.0	2.14	2*n*	A

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Δ (**I**)...Perry (*Eng. Mech.* **XXXVI,** 65)... Ho (2978).... Wilson ( ).... HΣ (**XII**).... Lewis (*Mon. Not.* **LXIV**, 805; **LXVI,** 31)...Doolittle (*Pub. Flower Obsy.* **II**)...]

31^m 4^s **11089.** **Σ 2810.** Without change.

1865.95	290°8	16″94	3*n*	Δ
1898.41	290.2	17.13	4*n*	Doo
1902.46	290.5	17.12	2*n*	Hu

[H (**IV, V**).... Δ (**II**)....Glasenapp (**III**)....Doolittle (*Pub. Flower Obsy.* **I**).... *Annals Toulouse Obsy.* **III**...]

31 15 **11093.** **H 1662.** The only position since H is:

1903.72	129°0	21″36	2*n*	β^6	9.2...12.5

31 16 **11094.** **H 1663.** This pair, and H 1662, are in the field *np* *ξ Aquarii.*

AB	1903.72	67°2	17″02	1*n*	β^6	9.8...12.0
AC	1903.72	95.6	33.58	1*n*	β^6	...12.0

31 24 **11095.** **Σ 2809.** Without change.

1866.17	162°8	31″13	3*n*	Δ
1881.65	163.1	31.33	3*n*	β
1903.57	162.7	31.05	2*n*	β

[H[1]...Ma (*F. S.* **I**)...Ma (**X**)...Mh...Δ (**II**)...Cin[5]...Cin[6]...β^4...Glasenapp (**II, III**)....*Annals Toulouse Obsy.* **III**....Coleman (*Mem. R. A. S.* **LIV**).... β^6...]

31 24 **11096.** **Σ 2812.** Relatively fixed.

1867.00	128°3	2″14	3*n*	Δ
1894.62	129.8	2.17	2*n*	Gla
1899.28	127.8	2.08	5*n*	Doo

[Ma (*F. S.* **I**)... Ma (**X**) ... H (**V**) ... Δ (**II**) ... Glasenapp (**III**) ... Doolittle (*Pub. Flower Obsy.* **I**)...]

31 30 **11097.** **Ho 463.** No other measures.

[Ho (3234)...]

31 30 **11098.** **A. G. 273.** Double in *A. G. Lund.* Measures by β^6.

31 39 **11100.** **OΣ 443.** (= **Ħ II. 62 = H 3041.**) Fixed. Measured as new by Δ (1736). Near 3 *Pegasi.*

1868.79	349°3	7″99	9*n*	Δ
1898.59	349.2	8.30	4*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Da[4]...WS...WS[2]...Δ (1736)(**I**; **II**, p. 586)...Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

31 41 **11101.** **Innes 302.** Discovered by Innes at the Cape Observatory.

1899.62	92°6	2″46	3*n*	Hu	9.0...10.3

[Innes (3501)(*Mon. Not.* **LXI,** 610)...Hu (*Bul. L. O.* No, 44)...]

11102. **Hn 46.** The later measures give a larger distance. 31^m 39^s

1888.79	199°0	1″72	4*n*	Com

[β^4...Com (**VI**)...]

11103. 3 *Pegasi.* **Σ 56, App.** I. (= **Ħ V. 98 = Sh 331 = OΣ** (**App**) **219**). Without change. The proper motion is 0″039 in 72°2 (Auwers). 31 45

1868.56	349°1	39″19	5*n*	Δ
1886.16	349.3	39.21	2*n*	Per
1892.67	348.3	39.38	2*n*	Gla
1899.85	349.4	39.35	1*n*	Lohse

[Da[1]... En ... Ra (**XXI, XXV, XXXV, XXXVIII**) ... Δ (1736)... Δ (**II**) ... Schur (2255).... Je (2343) .... Per (called Σ[1] 2612).... Maiebckato (*Obsns.* 1892).... Glasenapp (**II**)...Lohse (*Pub. Potsdam Obsy.*)...]

11105. **H 1668.** Noted as double in *A. G. Berlin.* The only measure is: 31 56

1901.43	36°0	8″23	3*n*	β^5	8.4...9.5

11106. **H 1669.** The magnitude of A in DM is 7.0. The only measure is: 31 56

1902.51	240°1	15″61	2*n*	β^6	7.8...12.0

11107. **Σ 57, App I.** *Cephei* **121, 123.** The principal star is given a proper motion of 0″049 in 224°0 (Battermann). The other star must have the same movement as there has been no relative change. 31 58

1868.75	25°8	180″07	5*n*	Δ
1879.31	25.8	180.60	6*n*	Je
1906.04	25.7	180.47	2*n*	β

[Ra (**XXVI**)...Δ (1736)...Δ (**II**)...Je (2345)...β^6...]

11109. **H. C. Wilson 23.** Approximate place. No other measures or references. 32 :

11110. **Σ 2811** *rej.* (= **Ħ IV. 38.**) No measures in Ħ. In *Catalogus Novus* about 5′ *n* of the place given here, with magnitudes 6 and 9–10. There is no bright star near except Σ 2809, and this may be the pair observed by Ħ. The magnitudes of that agree with the values given in *Catalogus Novus* for Σ 2811 *rej.* The pair in Part I, with measures from β^6, is a much smaller star but very near the place originally given for Σ 2811 *rej.* 32 8

11111. **See 451.** The later position is: 32 15

1899.67	257°5	11″82	3*n*	Cg	7.2...12.3

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11112. **Σ 2813.** Fixed. 32 21

1865.96	273°6	10″03	3*n*	Δ
1894.70	273.7	10.30	2*n*	Gla
1901.08	272.3	10.29	3*n*	Espin
1902.72	271.9	10.42	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**X, XI**)... H (**IV**)... Δ (**II**)... Glasenapp (**III**)... Espin (*Mon. Not.* **LXII**, 530)...]

32m 23s **11113.** **H 5285.** Nothing since but the following:

1877.79	292°5	10″65	2*n*	Cin^4	8.0...9.2

32 25 **11114.** Discovered by Hall with the 26-inch.

1887.78	127°6	2″04	2*n*	Hl	9 ...12
1903.57	123.3	1.93	3*n*	β	8.4...11.2

[Hl (**I, II**)...β^6...]

32 31 **11115.** 4 *Pegasi.* **H 941.** The change is due to the proper motion of the large star:

Auwers	0″089 in 69°7	
Boss	0.103 in 84.5	

The only measures are:

1878.71	344°9	25″95	1*n*	β^1	
1901.50	337.4	26.23	3*n*	β^5	6...12.0

32 31 **11116.** **A 297.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

32 51 **11120.** **Espin 34.** Discovered by Espin.

AB	1902.52	139°4	2″60	2*n*	β	9.0...11.2
AC	1902.52	70.4	39.71	2*n*	β	... 9.3

[Espin (3717)...β^6...]

32 58 **11121.** **β 371.** Discovered with the 6-inch.

1892.82	4°3	8″33	3*n*	Wilson
1899.30	3.3	8.80	5*n*	Doo

[β (**VI**)... β (2062)... Δ (**I**)... Wilson ( )... Doolittle (*Pub. Flower Obsy.* **I**)...]

33 20 **11125.** 24 *Aquarii.* **β 1212.** Discovered with the 36-inch. It was evident at the time of discovery that the close pair was a binary from the common proper motion of the components, as otherwise the duplicity would have been seen long ago. This proper motion is given by Auwers as 0″215 in the direction of 82°5. This corresponds, as might be expected, to the change in the distant star C. The motion of AB is in the angle only, the distance remaining unchanged.

All the measures are given.

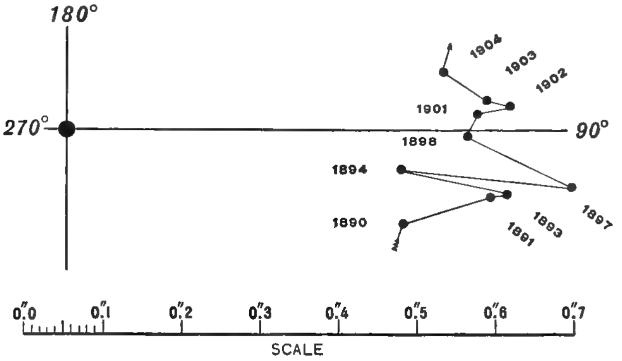
A and B

1890.75*	254°5	0″45	3*n*	β
1891.75*	261.0	0.55	4*n*	β
1892.40	256.2	0.38	2*n*	Sp
1893.68*	260.5	0.55	3*n*	Wilson
1893.88*	262.8	0.59	1*n*	Barnard
1894.82*	264.7	0.52	7*n*	Barnard
1894.86*	261.5	0.45	3*n*	Sp
1897.81*	263.5	0.65	3*n*	A
1897.89	267.4	0.73	1*n*	Brown
1898.78*	269.0	0.49	3*n*	A
1898.84*	269.0	0.54	1*n*	β
1899.77	261°6	0″51	1*n*	Bowyer
1900.67	205.1	0.5±	1*n*	Solà
1900.75*	272.2	0.55	2*n*	Do
1901.73*	270.2	0.48	9*n*	Bryant
1901.79*	274.0	0.55	2*n*	A
1902.00*	273.0	0.57	11*n*	Doo
1903.86*	273.8	0.54	2*n*	Biesbroeck
1904.67*	278.6	0.49	1*n*	A

AB and C

1891.76	141°0	44″46	2*n*	β
1893.83	141.2	43.92	2*n*	Wilson
1897.89	143.4	43.13	1*n*	Brown
1898.84	142.7	43.33	2*n*	β
1904.46	143.7	42.58	2*n*	β

The measures of C give 0″226 in 88°4 for the proper motion of AB.



24 Aquarii. β 1212.

[3 (**XVII**).... β (3047, 3114)(*Pub. L. O.* **II**).... Wilson ( ).... Sp (**III**).... Barnard (*A. J.* 447)... Brown (3646) ... A (3585)(*A. J.* 429)(*Bul. L. O.* No. 11) ... Solá (3679)... Do (3681)... Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805)... Biesbroeck... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...β^6...]

11126. **OΣ 444.** Unchanged. 33m 30s

1866.03	277°3	7″85	3*n*	Δ
1881.75	278.8	7.93	1*n*	Big
1899.06	277.4	8.16	4*n*	Hu

[Ma (**XIII**)... OΣ (**IX**)... Big... Δ (**I**)... Sk^3... Hu (*Pub. L. O.* **V**)...]

11127. Double in *Cordoba Zones.* 33 30

1903.72	66°0	5″03	2*n*	Scott	8.0...9.4

[See (3496)... Scott (*Mon. Not.* **LXIV**, 52)...]

11129. **β 686.** (AC = **OΣ (App) 220.**) The duplicity of the principal star of this wide pair was discovered with the 18½-inch. It is a difficult pair, and likely to prove an interesting one. The estimated magnitudes of B are very discordant. All the measures of C are given. This star is Rad^1 5330. The proper motion of A is 0″058 in 270° (*A. G. Harvard*). In my original position the quadrant was not noted, and Δ in one observation called the components equal, hence there may be no material change since 1877. 33 43

A and B

1877.58	297°5	0″4	1*n*	β	
1877.70	127.9	0.48	1*n*	Δ	7.7... 8.0
1885.52	296.5	0.80	1*n*	HΣ	8 ...10.5
1893.57	303.7	0.87	1*n*	W	8.5...11.0
1899.06	301.4	0.78	3*n*	A	8.0...12.3
1903.68	307.9	0.85	3*n*	Doo	8.3...11.3

AB and C (= OΣ App 220)

1875.96	11°0	41″22	3*n*	Δ
1878.65	11.0	41.67	1*n*	β
1883.23	10.9	41.53	4*n*	Fr
1893.57	10.9	41.05	1*n*	Wilson

[β (**X**)....β^1....Δ (**I**)....Wilson (   )....Franz (2649)....A (3639)....HΣ (**XII**).... Doolittle (*Pub. Flower Obsy*. **II**)...]

33^m 45^s **11130.** **OΣ 445.** No sensible change since 1847.

1869.12	109°6	0″86±	3*n*	Δ
1887.09	114.8	1.01	2*n*	HΣ
1895.82	115.9	0.71	3*n*	Coleman
1899.19	113.8	0.93	5*n*	Hu
1902.86	114.1	0.96	2*n*	Do
1904.74	113.7	0.72	1*n*	Lewis

[Ma (**XI**)...OΣ (**IX**)...Flm...Big...Sk^2...Δ (**I**)...Coleman (*Mem. R. A. S.* **LIII**) ...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Do (3931)...Biesbroeck...Lewis (*Mon. Not.* **LXVI**, 31)...]

33 46 **11131.** **Da 15.** Discovered by Dawes in 1859. The components appear to be fixed. The measures in Cin^5 belong to 75 *Cygni* (No. 11164).

1860.70	72°7	1″63	2*n*	Da	7.5...11
1874.73	71.3	1.55	1*n*	OΣ	7.5... 9.0
1881.59	69.5	1.46	1*n*	Ho	8...10
1887.80	72.6	1.47	2*n*	HΣ	7...10
1902.58	71.7	1.36	2*n*	A	
1903.48	73.6	1.36	2*n*	β	7.8...10.6

[Da (*Mon. Not.* **XXIV**, 117)...Da^4...Δ (**I**)...OΣ (**X**)...WS...WS^2...Ho (2978) ...HΣ (**XII**)...β^6...]

33 46 **11132.** **Kr 54.** Noted as double in *A. G. Hels.*

1898.36	129°0	16″48	4*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

33 56 **11133.** **Σ 2814.** (= **S** 794.) No change.

1865.58	160°9	7″84	3*n*	Δ
1903.53	160.6	7.95	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Wr...Du...Δ (**II**)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 805)...]

33 59 **11134.** *Δ* **25.** (AC = **Σ 2815.**) The duplicity of A of Σ 2815 was discovered by Dembowski in 1866. The only later measure is:

1902.64	154°0	1″02	3*n*	β	8.5...9.7

There is but little, if any, change in the Struve companion.

AB and C (= Σ 2815)

1865.99	83°1	7″48	3*n*	Δ
1895.77	83.9	7.98	2*n*	Gla
1902.72	82.3	7.78	2*n*	Hu

[Ma (*F. S.* I)...Ma (**X, XI**)...H (**IV**)...Δ (1/36)...Δ (**II**)...Glasenapp (**IV**)... Espin (*Mon. Not.* **LXII**, 530)...β^6...]

11135. **H 1672.** "Perhaps P = 81°0." This is Σ 2813, or Σ 2815; no other pair near (1876). 33^m 59^s

11136. **See 452.** A later measure: 34 6

1899.07	100°8	11″75	3*n*	Cg	7.8...13.2

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11137. **A. G. 274.** Double in *A. G. Berlin*. Measures by Miller (A. J. 546). 34 6

11138. **Hn 47.** The only other position is: 34 9

1888.48	224°9	6″75	3*n*	Com

[β^4...Com (**VI**)...]

11139. **OΣ 446.** Unchanged. 34 13

1866.37	173°7	6″20	3*n*	Δ
1898.64	173.6	6.36	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Glasenapp (**V**)...Hu (*Pub. L. O.* **V**)...]

11140. **A 772.** With later measures (*Bul. L. O.* No. 61) the mean is: 34 15

1904.54	27°2	0″25	3*n*	A	8.6...9.0

11142. **H 1673.** This is noted "dup. 1″" in *A. G. Bonn*, but perhaps this should be attached to DM (43°) 3996. (See No. 11143). The only measures of H 1673 are: 34 29

1900.75	82°8	5″76	1*n*	Es	8.3...8.8
1903.39	80.9	5.45	3*n*	β	9.0...9.2

[Espin (*Mon. Not.* **LXIV**, 679)...β^6...]

11143. **β 1331.** Found with the 40-inch in identifying H 1673. 34 34

[β^6...]

11145. **β 449.** (ACE = **Ħ III. 110 = OΣ 447.**) The two small stars, B and D, were noted with the 18½-inch. The brighter stars, ACE, make Ħ III. 110 = OΣ 447. They are relatively fixed. All the measures are given: 34 42

A and B

1876.80	19°1	6″78	1*n*	β
1891.51	15.6	6.09	3*n*	β
1898.69	14.5	6.13	2*n*	Hu

A and D

1876.80	248°.2	17″.94	1*n*	β
1889.94	239.6	15.70	1*n*	Ho
1891.51	247.2	17.45	2*n*	β

A and C (= H III. 110 = OΣ 447)

1783.81	157°.6	13″.90	1*n*	H
1848.30	169.4	13.96	4*n*	OΣ
1866.58	170.5	13.69	3*n*	Δ
1889.94	170.5	13.81	1*n*	Ho
1891.51	172.2	13.61	2*n*	β
1894.66	171.2	13.68	2*n*	Gla
1898.70	171.2	14.02	3*n*	Hu

A and E

1783.81	49°.4	25″.97	1*n*	H
1848.30	45.3	29.00	4*n*	OΣ
1866.58	45.7	29.12	3*n*	Δ
1889.94	45.1	28.85	1*n*	Ho
1891.51	44.6	28.95	3*n*	β
1894.66	44.9	28.92	2*n*	Gla
1898.70	44.9	29.01	4*n*	Hu
1899.76	43.6	29.19		Gr. Obsy.

The position of AE at the Greenwich Observatory is from a photograph. The places of several other more distant stars are also given.

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)...β (3114)(*Pub. L. O.* **II**)...Ho (2978)... OΣ (**X**)...Δ (**I**)...Glasenapp (**III**)... Greenwich Obsy. (*Mon. Not.* **LX**, 519)... Hu (*Pub. L. O.* **V**)...]

34^m 46^s **11148. Da 14.** Not measured by Dawes. The following are the only other measures:

1902.58	352°.4	3″.35	2*n*	A	
1903.47	351.9	3.66	3*n*	β	8.5...11.7

[Da (*Mon. Not.* **XXIV**, 117)...β (3114)(*Pub. L. O.* **II**)...β6...]

34 48 **11150. H 1680.** The only measures are:

AB	1906.06	263°.9	15″.75	2*n*	Doo	9.7...12.0
AC	1906.06	218.2	23.17	2*n*	Doo	12.5

Doolittle gives the correct place of H 1680, from a comparison with DM (63°) 1755:

$$\left.\begin{array}{l}\text{R. A.} = 21^h\ 34^m\ 11^s\\ \text{Decl.} = 63^\circ\ 20'\end{array}\right\}$$

34 53 **11151. β 687.** Discovered with the 18½-inch. Unchanged. The proper motion in *A. G. Harvard* is 0″.055 in 270°.

1885.55	4°.4	0″.66	3*n*	HΣ
1890.74	4.9	0.64	6*n*	Sp
1893.70	1.8	0.76	2*n*	Wilson
1898.65	2.5	0.83	4*n*	A
1901.79	5.1	0.91	3*n*	Doo

[β (**X**)...β1...Sp (**III**)...Wilson (   )...A (3585)... HΣ (**XII**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

34 55 **11152. Ho 464.** No other measures.

[Ho (3234)...]

11156. See 453. Later measures give: 35^m 7^s

1899.67	327°.0	11″.59	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11158. 41 *Capricornii.* **See 454.** This star has a proper motion of 0″.210 in 157°.4 (Paris). 35 10

1898.72	200°.0	5″.44	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11159. H 5291. No measures by Herschel. 35 12

1878.68	105°.6	24″.30	2*n*	Cin	8.2...9.0

[Cin5...Glasenapp (**I**)...]

11160. β 1143. (ACD = **Σ 2816** = **H** III. 71 = **S 795**.) The close companion to the principal star of the wide triple, Σ 2816, was discovered with the 36-inch. The old components appear to be relatively fixed. Auwers gives the proper motion of the principal star 0″.0167 in the direction of 153°.9. This should increase the distance of B about 1″ in the interval covered by the measures. The measures indicate a common movement in space. This is a naked-eye star in *Cepheus* (= B.A.C. 7545). The Harvard photometric magnitude is 5.5. 35 14

A and B

1889.62	323°.5	1″.55	3*n*	β	6.0...13.7
1898.75	325.0	1.73	2*n*	A	6.3...14.0

A and C (= Σ 2816)

1866.65	121°.2	11″.77	3*n*	Δ
1889.61	120.4	11.86	3*n*	β
1898.87	120.7	11.60	1*n*	A
1902.71	120.4	11.91	2*n*	Hu

A and D (= Σ 2816)

1866.65	339°.8	19″.81	3*n*	Δ
1889.61	339.5	19.94	3*n*	β
1898.87	339.4	20.15	1*n*	A
1902.71	339.4	20.05	2*n*	Hu

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...]

General references:

[Ma (*F. S.* **I**)....Ma (**IX, XI, XIII**)....Ra (**XXII**)....Wr (*Phil. Trans.* 1851).... Δ (1125)....Δ (**I**, p. 118; **II**)....H (**IV**)....Nobile (*Rend. Accad. Sci.* Napoli, Jan. 1875)...Gl...WS...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

11164. 75 *Cygni.* **A. C. 20.** (AC = **H 1628** = **OΣ** (**App**) **221**.) Close star discovered by Alvan Clark in 1859 at Dawes Observatory. Apparently unchanged since the first measures: 35 28

A and B

1860.02	322°.3	2″.87	3*n*	Da
1872.47	324.0	2.98	4*n*	OΣ
1881.59	323.6	2.59	3*n*	Ho
1887.80	322.8	2.73	3*n*	HΣ
1902.58	327.2	2.54	2*n*	A

A and C

1875.72	254°.8	54″.66	2*n*	OΣ
1880.57	254.6	54.86	1*n*	β
1881.58	254.4	54.47	1*n*	Ho
1886.78	254.8	55.31	1*n*	HΣ

75 *Cygni* has a proper motion of 0″.065 in 80°.2 (Auwers), and evidently the small star is moving with it.

[Da (*Mon. Not.* **XVII**, 257)...Da^4...Δ (I)...β^3...WS^2...Cin^5 (called Da 15)... Ho (2978)...OΣ (X)...Franz (3080)...HΣ (**XII**)...]
(See p. 1084)

35^m 40^s **11166.** **A. G. 275.** Double in *A. G. Leiden.* Measures by β^6.

35 42 **11168.** **OΣ 448.** The angle appears to be slowly decreasing. All the measures are given.

1843.56	245°.0	0″.57	2*n*	Ma
1845.64	247.7	0.70	3*n*	OΣ
1851.75	237.3	0.6±	1*n*	Ma
1870.47	243.1	0.69±	6*n*	Δ
1874.70	243.3	0.80	1*n*	N
1886.16	235.6	0.85	2*n*	Per
1887.43	234.4	0.83	2*n*	HΣ
1897.66	241.5	0.70	1*n*	Gla
1898.66	232.5	0.81	3*n*	Hu
1904.74	236.5	(2.10)	1*n*	Lewis

[Ma (**XI, XIII**)....OΣ (**IX**)....Δ (**I**)....Newcomb (*Wash. Obsns.* 1874)....Per.... Glasenapp (**V**)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**)....Lewis (*Mon. Not.* **LXVI**, 31)...]

35 46 **11170.** **A 298.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

35 48 **11171.** **β 372.** Discovered with the 6-inch. Near π *Cygni*, 2^m *p* and 22′ *n*. Probably unchanged. All the other measures are given.

1892.69	357°.2	1″.83	2*n*	Wilson
1899.72	349.2	1.83	3*n*	Doo
1902.49	352.7	1.91	3*n*	Hu

[β (**VI**)...β (2062)...Δ (**I**)...Wilson ( )...Hu (*Bul. L. O.* No. 44)...Doolittle (*Pub. Flower Obsy.* **I**)...]

35 55 **11172.** **H 3050.** Measures in *A. G. Leipzig*, p. 250:

1895.73	48°.1	25″.60	1*n*

35 58 **11173.** **Ho 164.** Without change.

		A and B		
1892.77	61°.8	3″.13	2*n*	Ho
1904.67	62.1	3.34	3*n*	Doo
		A and C		
1904.67	238°.1	25″.45	3*n*	Doo

[Ho (2779, 3234, 3558)...]

36 19 **11175.** **Σ 2817.** No motion.

1868.12	155°.7	25″.92	4*n*	Δ
1881.65	155.8	26.13	3*n*	β
1902.66	155.4	26.06	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**X**)....H (**V**)....Mh....Δ (**II**)....β^4....Glasenapp (**III**) ... T (3185)...]

36 23 **11177.** **Σ 2818** *rej.* This star has a proper motion of 0″.082 in 213°.4 (Battermann). The only measure is the following:

1905.38	20°.1	20″.61	2*n*	β^6	7.8...10.0

11178. **β 274.** Discovered with the 9.4-inch at the Dartmouth College Observatory. 36^m 26^s

1880.83	182°.4	3″.54	1*n*	Pt
1892.95	181.7	3.99	1*n*	Wilson
1898.52	177.4	3.59	2*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...Δ (**I**)...Pt...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

11179. **Ho 165.** Probably unchanged. These are all the other measures: 36 28

1895.70	70°.8	0″.3±	1*n*	Ho
1899.81	68.5	0.47	3*n*	Lewis
1900.25	74.2	0.38	4*n*	Bowyer
1905.84	67.3	0.52	3*n*	Doo

[Ho (2779, 3558)...Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486)...]

11180. **See —.** (= **Hu 967.**) Discovered by See at the Lowell Observatory, and later by Hussey at the Lick Observatory. 36 32

1904.75	60°.3	3″.35	2*n*	Hu	8.5...9.8

[See (3496)...Hu (*Bul. L. O.* No. 74)...] (See No. 13582)

11182. **Σ 2819.** (= **𝕳 III. 72 = S 797.**) Fixed. 36 38

1867.90	57°.2	12″.42	4*n*	Δ
1894.70	57.6	12.45	2*n*	Gla
1902.95	58.0	12.78	1*n*	Hu

[H (**IV**)...Ma (*F. S.* **I**)...Ma (**X**)...Ra (**XXII**)...WS...Gl...Δ (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]
(See p. 1084)

11183. **A 180.** No other measures. 36 40

[A (3741)(*Bul. L. O.* No. 3)...]

11184. 76 *Cygni.* **S 796.** (= **𝕳 V. 43 = σ 730.**) The proper motion of 76 *Cygni* is given: 36 45

Auwers	0″.048 in 199°.6	
Battermann	0.053 in 193.6	

The following are the only other measures:

1879.57	230°.0	64″.26	2*n*	Cin^5	6.0...9.0
1904.30	231.2	62.82	2*n*	β^6	

11186. **Hn 167.** No other measures. 36 53

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

11187. **β 373.** Discovered with the 6-inch. The south star of a wide pair. 37 1

1893.76	171°.3	4″.68	3*n*	Wilson
1898.93	171.3	4.57	3*n*	Doo

[β (**VI**)...β (2062)...Δ (**I**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

11188. **Howe 57.** Discovered by Howe at the Cincinnati Observatory. No evidence of change. 37 4

1885.72	303°.1	1″.50	1*n*	W	8.0...9.5
1897.23	299.2	1.41	4*n*	See	8.4...9.8

[Cin^3...Cin^4...Wilson (Cin^{10})...See (3496)...]

37^{m} 4^{s} **11189.** **OΣ 449.** No motion.

1869.19	120°6	1″28	5*n*	*Δ*
1895.64	118.2	1.23	1*n*	Gla
1898.67	121.6	1.16	3*n*	Hu

[*Δ* (I)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

37 6 **11190.** **Lv 10.** Discovered by Leavenworth at the Haverford College Observatory.

1886.73	270°1	1″46	6*n*	LM
1899.62	276.2	1.31	3*n*	Hu

[Lv¹....LM....O. Stone (*A. J.* 156)....*Proc. Haverford Coll. Obsy.* 1891....Lv (*A. J.* 407)...Hu (*Bul. L. O.* No. 44)...]

37 14 **11191.** **Σ 2820** *rej.* Lalande 42360. Measures by β^{6}. A 11 m star, 198°4 : 34″4.

37 31 **11196.** **Σ 2823.** Without change.

1866.29	249°8	1″60	3*n*	*Δ*
1894.62	254.3	1.63	2*n*	Gla
1904.75	252.7	1.70	1*n*	Hu

[Ma (*F. S.* I)...Ma (**XI**)...*Δ* (**II**)...Glasenapp (**III**)...]

37 43 **11199.** **OΣ (App) 222.** B is Lalande 42362. Unchanged.

1876.47	257°6	87″28	1*n*	Schur
1903.74	257.5	87.57	2*n*	β

[*Δ* (I)...Schur (2255)...β^{6}...]

37 43 **11200.** **β 688.** Discovered with the 18½-inch. This star is a short distance *sf* 77 *Cygni.* Taken together, the measures do not indicate any certain change. The following are all the observations:

1878.36	208°7	0″35	5*n*	β
1884.95	201.4	0.38	3*n*	HΣ
1887.70	207.1	0.3±	1*n*	Ho
1891.03	203.5	0.4±	7*n*	Sp
1898.74	200.8	0.52	3*n*	A
1900.71	199.1	0.47	2*n*	Do
1902.66	199.9	0.46	1*n*	A
1903.73	203.3	0.48	1*n*	Biesbroeck
1905.68	200.4	0.48	3*n*	Doo

[β (**X**)....β¹....Ho (2978)....Sp (**III**)....A (3585)....HΣ (**XII**)....Do (3681)....Biesbroeck...]

38 10 **11204.** **A 299.** Very close triple, and likely to be an interesting system. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

38 17 **11205.** ε *Pegasi.* **S 798.** (= **H** **VI.** 103 = σ 731 = **OΣ (App)** 223.) The proper motion is very small, 0″009 in 56°0 (Auwers).

		A and B			
1879.54	325°2	81″36	2*n*	β	...11.5
1901.79	324.9	82.08	2*n*	β	
		A and C			
1874.77	321°6	140″41	3*n*	*Δ*	2.7... 8.7
1879.51	321.4	140.27	1*n*	β	... 8.8
1901.80	321.3	141.11	3*n*	β	

[*Δ* (I)...Pk...β³...Lohse (*Pub. Potsdam Obsy*)...β⁵...]

11206. **See 456.** Later measures make the distance smaller. 38^{m} 22^{s}

1899.61	57°8	3″09	2*n*	Cg	8...11.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...] (See p. 1084)

11207. **Hd 167.** The nearest companion not in Hd. The identity of the principal star in SD is uncertain. Measures by A (*Bul. L. O.* No. 11). 38 27:

11208. 79 *Cygni.* **S 799.** (= **H** **VI.** 57 = σ 732.) No measures in H. The only measures since 1824 are: 38 28

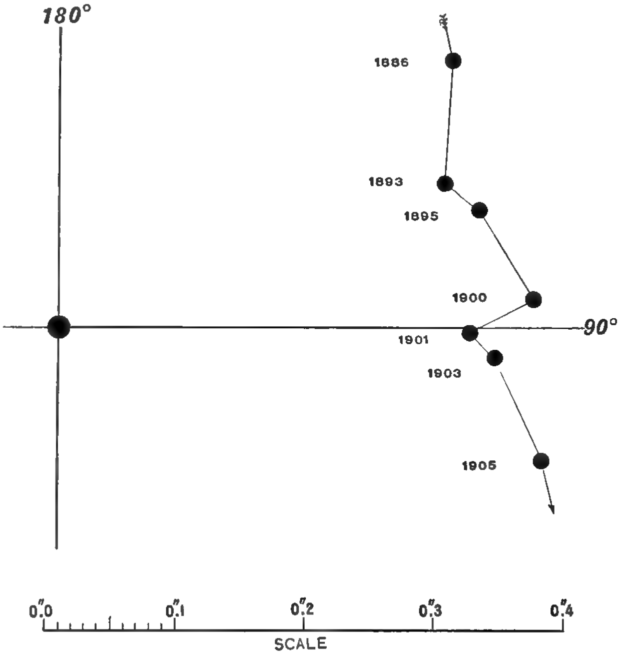
		A and B		
1896.56	59°6	153″01	5*n*	Soulé
1904.29	59.5	151.49	3*n*	β
1905.90	60.0	152.74	1*n*	Espin
		A and C		
1904.29	319°5	134″08	3*n*	β

Espin measures a small star near B:

1905.93	248°5	30″76	2*n*

[Soulé (*A. J.* 410)...β⁶...Espin (*Mon. Not.* **LXVI,** 144)...]

11210. **Ho 166.** In slow retrograde motion, and probably binary, but the motion so far is practically rectilinear. All the measures are given: 38 31



Ho 166.

1886.77	124°2	0″37	2*n*	Ho
1893.73	110.4	0.32	1*n*	Ho
1895.70	105.7	0.34	1*n*	Ho
1900.60	95.4	0.43	3*n*	A
1900.69	95.4	0.34	6*n*	Lewis
1900.73	89.3	0.34	2*n*	Do

{1901.07	88°.7	0″.29	2*n*	Bryant
{1901.99	90.0	0.35	4*n*	Bowyer
1903.79	86.1	0.34	8*n*	Lewis
1905.84	74.6	0.39	4*n*	Doo

[Ho (2779, 3234, 3558) ... Do (3681) ... A (*Bul. L. O.* No. 11) ... Greenwich Obsy (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805; **LXVI**, 31) ...]

38^m 40^s **11211.** β 1263. Discovered with the 36-inch. β 689 is 3^s *f* and 9′.6 *n*. The other measures are:

1900.06	216°.9	0″.48	3*n*	A
1900.82	238.4	0.59	1*n*	Doo

[β (**XVIII**) ... β (3113)(*Pub. L. O.* **II**) ... A (*Bul. L. O.* No. 11) ... Doolittle (*Pub. Flower Obsy.* **II**) ...]

38 43 **11213.** β 689. *Aquarii* 88. Lalande 42384. Discovered with the 18½-inch. The later measures show no motion:

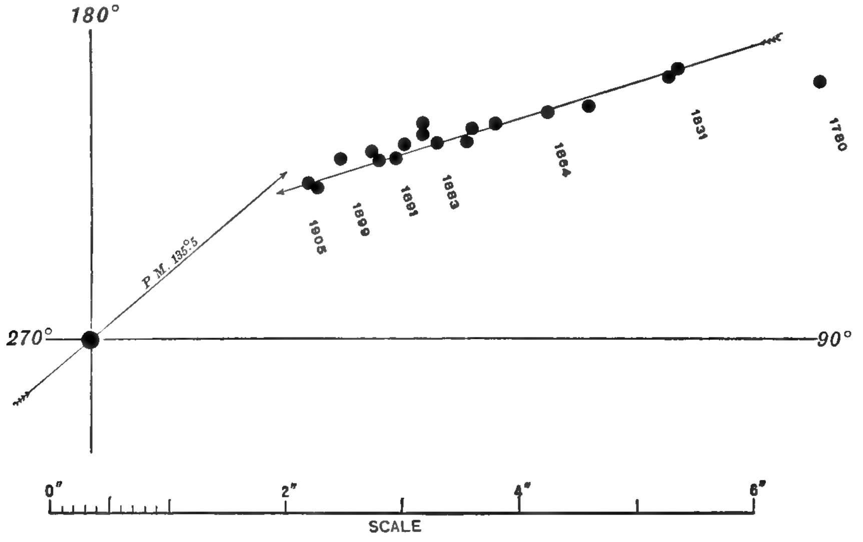
1885.69	237°.2	1″.68	2*n*	HΣ
1891.60	241.6	1.71	5*n*	β
1899.39	239.6	2.13	3*n*	A
1900.43	239.9	1.87	3*n*	Doo

[β (**X**) ... β1 ... β (3114)(*Pub. L. O.* **II**) ... A (3639) ... HΣ (**XII**) ... Doolittle (*Pub. Flower Obsy.* **I**) ...]

The following measures, giving the position of the companion at short intervals of time, are shown on the diagram:

1780.84	109°.3	6″.64	2*n*	H̥
1831.63	114.5	5.56	4*n*	Σ
1842.08	114.3	5.46	6*n*	Da
1853.26	115.0	4.72	2*n*	OΣ
1864.18	116.2	4.39	2*n*	OΣ
1872.85	117.8	3.95	5*n*	Δ
1875.68	117.5	3.66	3*n*	Sp
1877.96	118.7	3.76	3*n*	Δ
1883.69	119.2	3.42	5*n*	Per
1886.68	121.3	3.37	4*n*	Hl
1887.37	122.6	3.40	3*n*	HΣ
1889.76	121.3	3.18	4*n*	Hl
1891.96	120.2	3.05	2*n*	Big
1895.77	121.2	2.92	2*n*	Collins
1895.75	123.2	2.91	3*n*	Lewis
1899.73	125.4	2.65	2*n*	Lewis
1902.78	123.4	2.34	2*n*	Lewis
1905.62	125.2	2.30	3*n*	β

The small star, C, was first noted with the 18½-inch. The change corresponds to the proper motion of A, and therefore this is not a member of the system. These are all the measures:



μ Cygni. Σ 2822.

38 46 **11214.** *μ Cygni.* Σ 2822. (= H̥ III. 15 = Sh 332.) The observations to this time seem to be perfectly explained by the hypothesis of uniform rectilinear motion, and it appears to be a good illustration of the 61 *Cygni* class of double stars. At the present rate of movement the minimum separation of 0″.7 would be reached in about 50 years. The path described by the companion, however, may prove to be a part of a very elongated ellipse, but this will probably remain uncertain until it enters the third quadrant.

The proper motion of the principal star is given:

Auwers	0″.354 in 135°.5
Paris	0.367 in 133.0
Porter	0.351 in 132.2

A and C

1878.91	263°.2	35″.34	3*n*	β
1900.66	271.3	41.02	2*n*	β

The more distant star, D (Lalande 42409), was first measured by South.

A and D

1823.69	61°.3	217″.40	3*n*	Sh
1851.84	59.0	213.77	1*n*	OΣ
1854.69	58.7	213.42	1*n*	OΣ
1861.63	58.2	211.92	1*n*	OΣ
1866.72	57.8	211.35	1*n*	OΣ
1873.19	57.1	210.42	4*n*	Δ
1879.82	56.5	208.67	3*n*	β

1882.61	56°.2	209″.14	1*n*	OΣ
1886.78	56.0	208.67	2*n*	Eng
1889.63	55.8	207.94	2*n*	Gla
1906.29	54.1	206.07	2*n*	β

These measures of D, assuming that star to be fixed in space, give for the proper motion of A:

0″.355 in 123°.3

Taking the mean value of the motion from meridian positions as correct for that star, we have:

A = 0″.357 in 133°.3
D = 0.064 in 216.7

Kustner gives the latter from meridian observations:

0″.052 in 196°.2

[Ma (*F. S.* I)... Ma (303, 324)... Ma (**IX, X, XI, XIII, XV**)... H^1... H (**IV**)... Mh ....Wr....Bp....Da^3....Da^4....P^1....Se....Se^2....Ra (**XXII**)....Bru.... Bru^2....Flm....Du....Pl....Hd....Pk....WS....WS^2....Gl...Sk....UL.... Ba (**II, IV**)...Do (2199, 2242, 3466, 3681) (*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (*Mem. Accad. Sci.*).... Δ (1032, 1118, 1195, 1475, 1736, 2081).... Δ (**I, II**).... OΣ (**IX**; **X** pp. 114, 188)... Sp (2133)...Sp (**II, II** App)...Goldney (2257)... Je (2407, 2450)...Kustner (2584)...Per...Per (2559)...de Ball (2753)...T (2866)... Ferr...Engelhardt (**II**)...β^1...β^2...β^3...Hl (*Wash. Obsns.* 1886)...Hl (**I, II**) ....Knorre, etc. (*Beob. Berlin* No. 6, 1892)....Big....Big (*Bul. Ast.* **XII**, 299) ...Maw (I, **III**)...Glasenapp (**II, III**)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805; **LXVI**, 31)... Collins (*A. J.* 378)...Knorre (3300, 3518)...Ebell (3321)...Schwarzchild (3335) ...See (*A. J.* 359)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Thiele (3837)... Sk^5...Biesbroeck...Lohse (*Pub. Potsdam Obsy.*)...Lau (4078)...β^5...β^6...]

$38^m\ 47^s$ **11215.** Σ 2821 *rej.* The only measure of this is:

1905.59	226°.2	26″.85	2*n*	β^6	8.5...10.0

38 49 **11216.** **Ho** 167. Probably unchanged.

1896.20	47°.5	1″.60	2*n*	Ho	
1905.78	49.7	2.00	4*n*	Doo	9.2...11.1

[Ho (2779, 3558)...]

38 59 **11217.** **β** 374. Discovered with the 6-inch. It is 70^s *f* *π*^{1} *Cygni*, and 11′ *n*. No change.

1893.54	141°.3	1″.86	3*n*	Lv
1902.80	142.4	1.82	3*n*	Doo

[β (VI)...β (2062)... Δ (I)...Lv (*A. J.* 382)...Doolittle (*Pub. Flower Obsy.* II)...]

39 1 **11218.** **Ho** 605. The only later measure is:

1903.52	336°.1	1″.08	3*n*	Doo

[Ho (3558)...]

39 4 **11219.** **H** 3054. Nothing recent but the angle by Howe, 187°.6 (1877.73) 1*n*.

[H (VIII)...Cin^4...]

39 4: **11220.** **H** 285. A pair of small stars near DM (10°) 4617.

1901.66	67°.2	7″.64	2*n*	β^5	11.5...11.6

39 9 **11221.** **β** 1305. Found in measuring H 285. No other measures.

[β^5...]

$39^m\ 12^s$ **11222.** *κ Pegasi.* **β** 989. (AC = **Σ** 2824 = **Ḥ** **N.** 43.) Discovered with the 18½-inch in 1880. With perhaps a single exception, this binary has the shortest known period. As the distance never much exceeds 0″.2, it is always a difficult pair, and much of the time beyond the reach of all but the largest refractors. It has been well looked after by observers in the last 25 years, but many of the measures have large errors in both angle and distance, owing to the difficulty of the object. More than two revolutions have been made since the first observation, and the elements of the orbit are generally accurately known. The following investigations have been made:

1890	Burnham	11.13 yrs.	*Pub. L. O.* II, 128
1892	Glasenapp	11.54	*Mon. Not.* LII, 548
1893	Burnham	11.37	*Pub. L. O.* II, 252
1895	See	11.42	*Evolution of the Stellar System*
1904	Lohse	11.46	(Unpublished)

The following are all the measures of the close pair:

A and B

1880.68*	137°.9	0″.2 ±	4*n*	β
1883.02*	116.0	0.16	1*n*	En
1884.01	140.0	0.25	1*n*	En
1884.87*	104.7	0.22	1*n*	β
1887.70	283.7	0.4 ±	1*n*	HΣ
1887.82*	286.8	0.25 ±	1*n*	Sp
1888.78*	274.7	0.23	3*n*	β
1888.89	298.9	0.25 ±	3*n*	Sp
1889.51*	262.3	0.14	4*n*	β
1890.57*	187.1	0.10	4*n*	β
1890.93	136.4	....	1*n*	Sp
1891.72*	146.9	0.12	7*n*	β
1891.76	156.5	....	1*n*	HΣ
1891.93	159.0	0.20 ±	3*n*	Sp
1892.39*	132.8	0.18	4*n*	β
1892.88*	131.0	0.20	1*n*	Barnard
1892.97*	135.1	0.20 ±	4*n*	Sp
1893.51*	121.0	0.29	3*n*	Lv
1893.76*	127.5	0.20	2*n*	Barnard
1893.82*	130.5	0.25 ±	1*n*	Com
1893.93*	123.6	0.27 ±	8*n*	Sp
1894.50*	117.6	0.19	5*n*	Barnard
1894.84*	114.8	0.14	4*n*	Lewis
1894.88*	114.7	0.25 ±	6*n*	Sp
1895.60*	107.8	0.18	6*n*	Barnard
1895.72*	104.3	0.10	2*n*	Dyson
1895.74*	104.6	0.12	7*n*	Lewis
1895.73*	103.0	....	1*n*	Christie
1895.79*	112.7	0.15 ±	4*n*	Com
1895.91*	108.1	0.20 ±	4*n*	Sp
1896.64*	80.9	0.09	6*n*	Lewis
1896.68*	93.7	0.09	3*n*	A
1897.57*	27.0	0.09	4*n*	Lewis
1897.76*	16.6	....	1*n*	Lewis
1897.80	4.8	....	1*n*	Dyson
1897.90	342.0	....	1*n*	Lewis
1898.50*	294.5	0.16	5*n*	A
1898.66*	304.6	0.10	2*n*	Barnard
1898.68	296.1	0.27	5*n*	Lewis
1898.88	289.7	0.35	2*n*	Bowyer
1899.47*	284.0	0.19	4*n*	A
1899.73*	274.7	0.19	9*n*	Lewis
1899.80	291.4	....	1*n*	Lohse
1899.80	274.6	0.15	1*n*	Bowyer

1899.81	282°.2	0″.24	2*n*	Brown
1899.81	281.5	0.20	2*n*	See
1900.55*	259.2	0.14	5*n*	Lewis
1900.59*	267.8	0.17	4*n*	A
1900.61*	253.3	0.16	1*n*	Bryant
1900.69*	251.2	0.14	4*n*	Bowyer
1900.86*	256.3	0.15	1*n*	A
1901.02*	239.7	0.12	2*n*	Lewis
1901.03*	236.6	0.14	3*n*	Bowyer
1901.44*	243.2	0.10	2*n*	A
1901.63*	189.8	0.10	5*n*	Lewis
1901.73*	201.4	0.11	6*n*	Bryant
1901.87	182.2	0.09	1*n*	Bowyer
1901.97	209	0.07±	1*n*	A
1902.61*	164.0	0.13	3*n*	Bryant
1902.76*	164.3	0.15	4*n*	Lewis
1902.92*	171.8	0.14	2*n*	A
1903.52*	139°.5	0″.14	4*n*	A
1903.74*	141.9	0.22	2*n*	Doo
1903.74*	137.6	0.18	5*n*	Lewis
1903.82*	139.3	0.24	1*n*	Biesbroeck
1903.83*	131.4	0.25	5*n*	Bowyer
1903.85*	125.1	0.18	3*n*	Bryant
1904.82*	124.8	0.26	4*n*	Lewis
1904.83*	121.2	0.16	3*n*	Bowyer
1904.94	111.1	....	1*n*	Lohse
1904.94*	123.8	0.24	2*n*	A
1905.69*	115.3	0.25	1*n*	A

The measures marked (*) are shown on the diagram. A mean is given of the bracketed positions. The principal star has a small proper motion which is given from meridian observations:

Auwers	0″.020	in 67°.2
A. G. Berlin	0.013	in 90.0

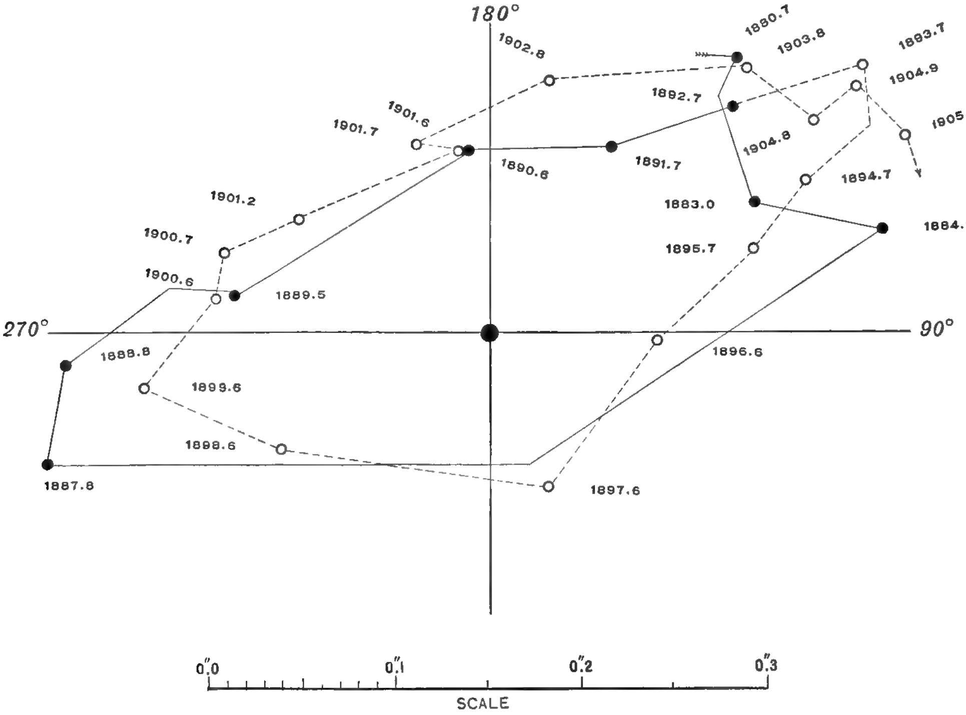
AB and C (= Σ 2824)

1831.56	308°.5	11″.01	5*n*	Σ
1853.19	306.1	11.63	9*n*	Ma
1864.87	303.9	11.56	6*n*	Δ
1880.60	303.1	11.76	4*n*	β
1888.81	300.0	12.13	3*n*	Hl
1888.82	300.7	12.22	2*n*	β
1895.60	301.1	12.28	8*n*	Barnard
1898.43	299.6	12.43	1*n*	A
1898.71	298.8	12.45	3*n*	Lewis

The nine measures of the Struve companion give for the most probable value of the proper motion of AB:

0″.034 in 69°.2

This should be more accurate than that derived from meridian observations. One of the components of the close pair is supposed to be a spectroscopic binary from observations by Campbell at the Lick Observatory (*Astrophysical Jour.* XII, 256).



κ Pegasi. β 989.

[β (**XIII**)...β³...β (2875, 2957, 3048, 3114, 3142)(*Pub. L. O.* **II**, pp. 128, 252)(*Mon. Not.* **XLI**, 33; **LI**, 313)(*Pop. Ast.* **I**, 352) ... En (2678, 2742) ... Sp (**III**) ... Barnard (*A. J.* 447)...Com (**X**)...LM...Lv (*A. J.* 382)...Hadley (*Pop. Ast.* **XIII**, 326)...Greenwich Obsy. (*Mon. Not.* **LV**, 17; **LVI**, 359; **LIX**, 400; **LX**, 514, 519; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805; **LXVI**, 31)... HΣ (**XII**) ... Lohse (*Pub. Potsdam Obsy.*)...Campbell (*A. S. P.* **XII**, 202)... Brown (3646)...See (3285, 3314, 3646)(*A. J.* 378)(*Evolution of the Stellar System*)... Biesbroeck... Doolittle (*Pub. Flower Obsy.* **II**) .... A (3396, 3585, 3639)(*Bul. L. O.* No. 11) (*Pub. A. S. P.* **XII**, 255; **XV**, 217)...]

(See p. 1084)

General references:

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H (**IV**)...Kn...Gl...WS²...Sk...Sk⁵ ...Hl (**II**)...Δ (1573)...Δ (**II**)...Hd...Flm...Maw (**II**)...Everett (*Mon. Not.* **LVI**, 464)....Coleman (*Mem. R. A. S.* **LIII**)....Big (*Bul. Ast.* **XII**, 299) .... Glasenapp (**III**)...Gore (*Brit. Ast. Ass'n* **XIV**, 280)...]

$39^{m}\ 42^{s}.5$ **11225.** **H 3154.** "An uncertain reduction of pos." The close proximity of this star to the pole makes the exact R. A. somewhat uncertain. The reduced place given here was computed by Howe.

39 50 **11227.** *μ Cephei.* **β 690.** This is Herschel's "Garnet star," variable 4 to 6m in five or six years; and is No. 253 of Schjellerup's *Catalogue of Red Stars.* The companions were detected with the 18½-inch. No change.

A and B

1889.52	259°.6	19″.58	3*n*	β
1898.58	260.0	19.36	2*n*	β
1901.64	259.5	19.61	2*n*	Doo

A and C

1898.58	298°.7	41″.14	2*n*	β
1901.64	298.9	41.27	2*n*	Doo

[β (**X**)...β^1...β^3...β (2957)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

39 50 **11228.** **See 458.** Distance larger in the later measures.

1899.59	89°.3	0″.86	3*n*	Cg	8.7...9.7

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

39 52 **11229.** **H 1687.** "Middle star of three." This is in the field with and closely *f* DM (45°) 3647.

1900.75	51°.0	5″.44	1*n*	Es	9.4...9.9
1902.94	56.0	4.85	2*n*	β	9.4...9.6

[Espin (*Mon. Not.* **LXIV**, 679)...β^6...]

39 55 **11232.** **Ho 606.** Only this later:

1901.74	92°.8	16″.67	3*n*	Doo

[Ho (3558)...]

39 58 **11233.** **A. G. 276.** Double in *A. G. Berlin.* Hu measures another and similar pair 22ˢ *f* and 2′ *n*, 305°.6 : 2″.16 : 10.0...11.0 (1901.70) 3*n*.

1904.56	359°.7	1″.97	2*n*	Bowyer

[Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...Bowyer (*Mon. Not.* **LXVI**, 31)...]

40 3 **11235.** **OΣ (App) 224.** No material change.

1891.12	6°.3	58″.14	4*n*	Franz

[Δ (I)...Franz (3464)...]

40 4 **11236.** **β 691.** Discovered with the 18½-inch. The only other measure shows considerable change.

1899.76	316°.1	0″.76	1*n*	Barnard

[β (**X**)...β^1...]

40 21 **11238.** **Arg 43.** "Duplex" in O. Arg. N. The components are DM (48°) 3491 and 3492. The 40-inch shows a new star 14m near B.

AB	1904.57	15°.4	27″.00	2*n*	β^6
BC	1904.57	88.2	6.71	2*n*	β^6

$40^{m}\ 24^{s}$ **11239.** *δ Capricorni.* **H 3056.** "Taken as an object of comparison with the satellites of Uranus, it is brighter than either of them, and no one need look for them with a telescope which does not show the small star of this double well". In H (VII) B is called 18m. Readily seen with 6-inch (1875), but distance more than 60″. The only measure is:

1901.73	301°.7	115″.23	3*n*	β^6	...12.7

The principal star has a considerable proper motion:

Auwers	0″.370 in 141°.6	
Bossert	3.387 in 140.8	

The change in the position of the Herschel companion in 70 years, due to the proper motion of A, would increase the distance at least 25″. The 40-inch shows a star several magnitudes fainter, and now nearer than the other star, which H could not have seen.

1901.73	94°.2	69″.10	3*n*	β^6	...15.8

11240. **A. G. 277.** Double in *A. G. Berlin.* Measures by Hu. 40 30

[Hu (*Bul. L. O.* No. 44)...Miller (*A. J.* 546)...]

11241. **OΣ 450** *rej.* Rejected in the second edition of *Poulkowa Catalogue.* 40 32

1895.63	248°.5	42″.62	2*n*	Gla
1898.76	248.9	42.56	4*n*	Hu

[Ma (**XI, XIII**)...Δ (I)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

11244. **Ho 168.** Hough mentions three small stars near, 19″ to 32″ distant. 40 41

1896.22	247°.1	0″.91	1*n*	Ho
1904.66	246.8	1.18	3*n*	Doo

[Ho (2779, 3558)...]

11245. **Σ 2827.** (= **H 1690.**) There may be a little change in angle and distance. 40 46

1866.60	207°.5	4″.49	3*n*	Δ
1905.46	204.6	4.79	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...β (*Mon. Not.* **XXXIV**, 380)...β^6...]

11246. **Σ 2825.** The measures are discordant, but show some increase in the angle, the distance remaining constant. 40 46

1827.72	100°.2	1″.09	3*n*	Σ
1842.70	110.6	1.00	3*n*	Ma
1847.16	107.5	1.06	2*n*	OΣ
1868.24	108.1	1.07	4*n*	Δ
1884.72	111.8	1.04	2*n*	Per
1887.84	113.8	0.98	2*n*	Hl
1890.78	112.4	0.96	3*n*	T
1895.74	113.8	1.05	2*n*	Collins
1896.53	113.8	0.98	3*n*	Lv
1902.85	117.3	1.08	3*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H (**V**)...Hd...Se...Se^2...OΣ (**IX**)...Δ (1800)...Δ (**II**)...Flm...WS^2...Sk...UL...Sp (**II**)...Per...Per (2749)...Hl (**II**)...T (2991, 3185)...Glasenapp (**II**)...Collins (*A. J.* 378)...Lv (*A. J.* 407)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 514; **LXII**, 398; **LXIV**. 805)...Coleman (*Mem. R. A. S.* **LIII**)...Sk^5...**HΣ** (**XII**) ...Do (3931)...]

$40^{m}\ 57^{s}$ **11249.** **Howe** 58. (AC = **Σ 2826**.) The close pair was discovered by Howe at the Cincinnati Observatory in 1879. So far the measures do not indicate motion.

A and B

1879.77	105°5	0″8±	1*n*	Cin
1882.62	96.9	0.92	1*n*	Wilson
1886.76	106.7	0.95	1*n*	Lv
1899.87	103.7	0.64	4*n*	Hu

The Σ companion is fixed with reference to the principal star.

AB and C

1868.12	83°7	3″77	4*n*	Δ
1886.72	82.2	4.22	5*n*	Lv
1890.64	81.9	4.28	3*n*	β
1899.87	82.4	4.26	4*n*	Hu

[Ma (*F. S.* I)...Ma (**X, XI**)...H^{1}...H (**V**)...Mh...Se...Δ (**II**)...Cin^{4}...Cin^{5}...Cin^{6}...Wilson (Cin^{10})...LM...Glasenapp (**III**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...β (3048)(*Pub. L. O.* **II**)...*Annals Toulouse Obsy.* **III**...Pidoux (3889)...]

40 57 **11250.** **A** 181. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

40 59 **11251.** **β** 1036. Discovered with the 12-inch.

1895.79	209°2	4″70	3*n*	A
1897.72	205.1	4.76	3*n*	A

[β (**XIV**)...β (2875)(*Pub. L. O.* **II**)...A (*A. J.* 429)(*A. S. P.* **VII**, 305)...]

41 23 **11252.** **H** 1689. (= **Ho** 607.) The only measures are:

1896.00	47°0	10″69	3*n*	Ho	8.2...11.7
1903.13	45.1	10.66	3*n*	Doo	

[Ho (3558)...]

41 24: **11253.** **Ḥ N.** 130. Described by Ḥ, "double 1st class. It is a small star, equally distant from *d* and *μ Capricorni*, but a little more south than either. It is a little nearer *μ* than *d*."

I could find nothing of Cl. I in or near this place (1873). There is some error in the assumed place, and from the absence of description, it is impossible to identify it with certainty.

41 25 **11254.** **O. Stone** 55. See gives this as Cord. DM (27°) 15615, the place of which is:

R. A. = $21^{h}\ 39^{m}\ 52^{s}$
Decl. = − 27° 39′

Probably fixed:

1885.71	186°1	3″±	1*n*	Wilson
1897.63	174.6	3.88	1*n*	See

[Cin^{4}...Cin^{5}...Cin^{6}...Wilson (Cin^{10})...See (3496)...]

41 25 **11255.** **Ho** 608. No change.

1902.15	119°2	0″52	4*n*	Doo	8.0...9.9
1904.74	126.5	0.55	2*n*	Lewis	

[Ho (3558).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**).... Lewis (*Mon. Not.* **LXVI**, 31)...]

$41^{m}\ 29^{s}$ **11256.** **Barnard** 15. Discovered with the 40-inch. Measures by A (*Bul. L. O.* No. 11).

42 6 **11259.** **A** 300. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

42 15 **11260.** **H** 1691. These are all the measures:

1877.81	276°8	14″68	1*n*	β^{1}	
1905.54	277.1	14.00	2*n*	β^{6}	8.0...10.9

42 15 **11261.** **Ho** 466. The *n* star of a pair.

1905.78	143°7	1″56	6*n*	Doo

[Ho (3234)...]

42 23 **11262.** **H** 1694. (BC = **Espin** 36.) The only measures are:

AB	1900.91	13°7	20″08	2*n*	Es	9.0...
BC	1900.91	139.4	7.45	2*n*	Es	9.2...12.2

[H (**V**)...Espin (3717)...]

42 28 **11264.** **A** 404. A 14.5m star 10″ from A *p*.

[A (*Bul. L. O.* No. 29)...]

42 49: **11267.** **Σ** 2837. Bigourdan gives the reduced R. A. $21^{h}\ 46^{m}\ 38^{s}$. This is DM (82°) 657. Rectilinear motion.

1832.30	321°3	2″16	3*n*	Σ
1869.48	305.2	2.33	6*n*	Δ
1881.48	301.5	2.67	3*n*	β
1889.42	298.6	2.38	3*n*	Hl
1894.62	296.5	2.75	2*n*	Gla
1900.30	295.1	2.71	3*n*	Doo
1905.62	293.3	2.44	2*n*	β

[Ma (*F. S.* **I**)... Ma (**XI**)... Δ (1800)... Δ (**II**)... Big... Sk... WS^{2}... Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Flm...Hl (**II**)...β^{4}...Glasenapp (**III**)... Collins (*A. J.* 378)...Doolittle (*Pub. Flower Obsy.* **I**)...Sk^{5}...β^{6}...]

(See p. 1084)

42 53 **11268.** "Double Cl. I" in Cordoba Zones. Measures by See (3496).

43 11 **11270.** **H** 1696. "The chief star in a cluster."

1905.51	140°1	17″21	1*n*	β^{6}	9.2...11.5

43 21 **11271.** **H** 1695. Nothing but this since H:

1903.38	114°6	13″58	2*n*	β^{6}	10.6...11.7

43 26 **11272.** **Σ** 2828. The distance of AB is increasing, without change in angle. The measures by Hl, Se, Gla, etc. of AB, which appear to show a smaller angle, belong to AC. As there is no sensible change in BC, the large star has a proper motion of 0″050 along the line of AB.

A and B

1829.09	142°5	23″79	3*n*	Σ
1864.68	142.6	25.59	3*n*	Δ
1871.09	143.2	25.99	3*n*	Du
1874.84	142.3	26.26	1*n*	OΣ
1886.59	141.6	26.90	3*n*	Per
1896.60	141.7	27.21	3*n*	Lv
1897.76	142.0	27.42	4*n*	Doo
1902.85	141.4	27.58	3*n*	Do
1904.94	141.6	27.60	3*n*	β

B and C

1829.09	37°0	3″64	3*n*	Σ
1864.68	40.0	3.88	3*n*	Δ
1888.90	39.0	3.84	3*n*	Hl
1897.76	38.5	3.94	4*n*	Doo
1902.85	39.9	3.88	3*n*	Do
1904.94	41.3	3.57	3*n*	β

The 40-inch shows a 14 m star near A, 75°5 : 10″3.

Ma (*F. S.* **I**)...Ma (**X**)...H (**VII**)...OΣ (**IX**)...Δ (1573)...Δ (**II**)...Flm...WS^2 Sk^2...Du...Per...Glasenapp (**II**)...Hl (**II**)...Collins (*A. J.* 378)...Lv (*A. J.* 407)....Soulé (*A. J.* 410)....Do (3931)....Doolittle (*Pub. Flower Obsy.* **I**).... *Annals Toulouse Obsy.* **III**...β^6...]

13^{m} 48^{s} **11274.** **H** 3059. The only measures are:

1877.78	252°7	25″49	1*n*	Cin	7.2...10.2
1879.75	253.7	24.91	1*n*	Cin	7.0...11.0

[H (**VIII**)...Cin^4...Cin^6...]

43 58 **11275.** **β** 1306. Found with the 40-inch. No other measures.

[β^6...]

44 7 **11276.** **Σ** 2829. Fixed.

1865.54	15°5	17″04	3*n*	Δ
1894.58	15.6	17.16	2*n*	Gla
1903.88	15.2	17.41	1*n*	Lewis

[Ma (*F. S.* **II**)....Δ (**II**)....Glasenapp (**III**)...Coleman (*Mem. R. A. S.* **LIII**).... *Annals Toulouse Obsy.* **III**...Lewis (*Mon. Not.* **LXIV**, 805)...]

44 15 **11277.** **See** 460. Later measures:

1899.68	118°3	0″57	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

44 17 **11278.** **A** 301. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

44 18 **11279.** **Hn** 48. No motion.

1888.46	22°8	4″64	3*n*	Com	8.7...9.6

[β^4...Com (**VI**)...]

44 31 **11281.** **Ho** 169. The other positions are:

1893.26	135°3	3″16	2*n*	Ho	8...11
1902.63	135.1	3.38	4*n*	Doo	

[Ho (2779, 3234)...]

11283. **β** 692. Discovered with the 18½-inch. There would seem to be an error of 180° in my angle of AC. 44^{m} 49^{s}

A and B

1881.72	12°7	2″79	1*n*	Ho	8.0...11.0
1885.66	11.0	2.76	2*n*	HΣ	
1892.79	8.8	2.97	1*n*	Ho	7.0...11.0
1899.97	12.9	2.65	4*n*	Doo	7.4...12.3

A and C

1892.79	298°9	37″13	1*n*	Ho	...11.0
1899.97	298.6	37.20	4*n*	Doo	...11.3

[β (**X**)...β^1...Ho (2978, 3234)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11285. **Σ** 2832. No change in seventy years. 44 51

1865.93	213°3	13″10	3*n*	Δ
1879.43	211.2	13.27	1*n*	Cin
1903.39	213.7	13.15	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**X**)....H (**IV**)....Δ (**II**)....Cin^5....*Annals Toulouse Obsy.* **III**...] (See p. 1084)

11287. **H** 1697. OΣ calls principal star *red; Δ orange.* Relatively fixed. 44 57

1876.14	260°7	9″11	4*n*	Δ	7.5...11.2
1885.68	260.6	9.00	2*n*	HΣ	
1900.66	260.4	8.86	2*n*	Es	

[Δ (**I**)...OΣ (**X**)...HΣ (**XII**)...Espin (*Mon. Not.* **LXIV**, 679)...]

11290. **Σ** 2830 *rej.* The only measure: 45 6

1905.53	236°9	24″20	2*n*	β^6	8.4...10.5

11291-2. **H** 945 **and H** 946. The only measures are: 45 6

H 945	1905.51	313°9	10″63	1*n*	β^6	10.8...10.8
H 946	1905.51	245.5	21.85	1*n*	β^6	10.5...10.6

11295. **H** 3062. "A pretty double star." Only recently measured. There are two more distant companions on the *p* side. 45 18

1904.54	125°2	21″32	2*n*	β^6	8.2...10.5

11296. **Σ** 2831. No change. 45 21

1866.95	357°4	14″45	3*n*	Δ
1879.64	355.9	14.60	1*n*	Cin

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**V**)...Δ (**II**)...Cin^5...]

11297. **Ho** 170. Only this later: 45 29

1895.70	162°9	0″3±	1*n*	Ho

[Ho (2779, 3558)...] (See p. 1084)

11299. **Σ** 2835. Probably unchanged. 45 44

1868.71	273°7	1″90	3*n*	Δ
1905.70	272.0	1.70	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X**)...H (**IV, V**)...Δ (**II**)...β^6...]

45m 44s **11300.** **A** 182. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

45 57 **11301.** **H** 947. (= **Ħ N.** 74.) No measures in Ħ. The only measures since show no motion.

A and B

1879.56	92°9	20″26	3*n*	*β*	6.7...10.0
1901.81	94.2	19.96	2*n*	*β*	7.0...10.7

A and C

1879.56	324°8	24″08	3*n*	*β*	...12.1
1901.81	322.0	24.33	2*n*	*β*	...11.7

[P. Smythe (*Mon. Not.* **XXIII**, 8)...β^{1}...β^{3}...β^{5}...]

46 2 **11302.** **Σ** 2833. Without change.

1865.07	338°1	8″97	3*n*	*Δ*
1888.90	338.2	9.10	3*n*	Hl
1902.94	337.5	9.04	1*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H (**V**)...Hd...*Δ* (**II**)...Flm... Sk^{3}... β^{1}...Cin^{5}...Hl (**II**)...Glasenapp (**III**)...*A. G. Leipzig*, p. 250...HΣ (**XII**) .. Do (3931)...]

46 2 **11303.** **Σ** 2834. Without change.

1865.75	290°9	4″29	3*n*	*Δ*
1893.68	289.6	4.29	2*n*	Gla
1903.88	300.6	3.77	1*n*	Lewis

[Ma (*F. S.* **I**) ... Ma (**XI**) ... *Δ* (**II**)...Glasenapp (**III**)...Lewis (*Mon. Not.* **LXIV**, 805)...]

46 4 **11305.** **H** 5298. The only measures are:

1891.60	311°2	59″96	4*n*	Gla	8.5...9.3

[Glasenapp (**I, II**)...]

46 21 **11306.** **Σ** 2836. Fixed.

1866.27	153°3	11″79	3*n*	*Δ*
1905.76	153.1	11.45	2*n*	*β*

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...*Δ* (**II**)...Do (3023)(*Trans R. I. Acad.* **XXIX**, Part 13)...β^{3}...β^{6}...]

(See p. 1084)

46 22 **11307.** **Hn** 49. Probably fixed.

1888.76	341°0	2″28	4*n*	Com	9.0...10.5

[β^{4}...Com (**VI**)...]

46 43 **11309.** **β** 840. Discovered with the 15½-inch at the Washburn Observatory. The magnitude in SD is 9.2. No motion.

1886.84	39°1	2″92	3*n*	UL	
1887.84	36.9	2.94	3*n*	Com	8.8... 9.8
1899.15	36.3	2.71	4*n*	Doo	9.0...10.0

[*β* (**XII**)...β^{4}...Com (**VI**)...UL...Doolittle (*Pub. Flower Obsy.* **I**)...]

11311. **Ho** 171. Without change. The following are all the other measures: 46m 45s

1892.76	177°3	0″63	1*n*	Ho
1895.74	173.1	0.75	3*n*	Ho
1900.56	175.5	0.86	3*n*	A
1900.90	159.7	0.81	1*n*	Bowyer
1901.36	172.6	0.79	3*n*	Bryant
1901.75	173.1	0.78	11*n*	Lewis
1904.66	175.8	0.52	4*n*	Bowyer
1904.79	172.4	0.83	4*n*	Doo

[Ho (2779, 3234, 3558)...Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 805; **LXVI**, 31)...A (*Bul. L. O.* No. 11)...]

11314. **Kr** 55. Noted as double in *A. G. Hels.* The later measures are: 47 1

AB	1899.44	355°7	4″67	6*n*	Doo	8.7...8.7
AC	1899.44	20.7	16.25	6*n*	Doo	...9.7

[*β* (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11315. **Ho** 172. A 12m star, 52°1 : 51″70. 47 5

1895.71	87°6	10″63	1*n*	Ho

[Ho (2779, 3558)...]

11316. **H** 615. No motion. 47 6

1879.75	67°1	12″30	2*n*	Cin	7.5...9.0
1905.58	67.5	12.18	1*n*	*β*	8.0...9.3

[J^{2}...H (**V**)...Cin^{6}...β^{6}...]

11317. **Hu** 380. (AB = **β** 168 = **Hd** 168.) The smaller component was found to be a close pair by Hussey with the 36-inch in 1901. The wide pair, which was found with the 6-inch, is also given in the subsequently published Harvard observations. By a curious coincidence the *β* and Hd numbers are the same. There is no change in these stars. All the other measures are given. 47 7

A and BC

1868.84	73°6	6″10	1*n*	Hd	7.5...8.5
1877.69	73.7	5.50	2*n*	Cin	8.1...9.7
1882.48	73.7	5.93	1*n*	Wilson	8.0...9.5
1893.80	70.2	4.78	2*n*	Sellors	8 ...9
1896.56	74.0	5.59	5*n*	Hu	

[*β* (**III**)...*β* (*Mon. Not.* **XXXIV**, 59)...Hd...Cin^{3}...Cin^{4}...Wilson (Cin^{10})... Sellors (3240)...Hu (*A. J.* 397)(*Bul. L. O.* No. 12)...]

11318. **Hn** 50. Comstock refers to a 13.5m star, 340° : 5″, not previously seen. No change in AB. The only measure of AC is given below. 47 14

AB	1888.48	174°6	1″62	3*n*	Com	8.8...10.3
	1905.70	172.2	1.46	2*n*	*β*	
AC	1905.70	339.6	7.81	2*n*	*β*	...13.5

[β^{4}...Com (**VI**)...β^{6}...]

47m 27s **11320.** **OΣ 451.** (= **H 1702.**) Unchanged.

1867.49	223°.6	4″.29	4*n*	*Δ*
1898.60	223.1	4.38	3*n*	Hu

Dembowski measures a faint pair in the field 2′ *n*, 131°.1: 3″.24 : 9.3 . . . 10.2 (1868.60) 3*n*.

[OΣ (**IX**) . . . Da³ . . . *Δ* (1736) . . . *Δ* (**I**, pp. 207, 375) . . . Hu (*Pub. L. O.* **V**) . . .]

(See p. 1084)

47 47 **11321.** Measured by mistake for H 3066 (No. 11326). No previous observation.

[β⁶ . . .]

47 55 **11322.** **Σ 2842.** Fixed.

1867.27	101°.7	3″.41	3*n*	*Δ*
1889.71	100.8	3.60	2*n*	Hl
1905.90	103.3	3.24	2*n*	β

[Ma (*F. S.* **II**) . . . . Ma (**XI, XIII**) . . . . H (**IV**) . . . . *Δ* (**II**) . . . . Hl (**II**) . . . . Flm . . . . Collins (*A. J.* 378) . . . β⁶ . . .]

47 57 **11323.** **Σ 2840.** (= **H IV. 79** = **H N. 57** = **Sh 334.**) Very little change. The proper motion is 0″.030 in 146°.3 (*A. G. Hels.*).

1867.64	195°.0	19″.47	4*n*	*Δ*
1868.49	194.5	19.39	3*n*	Du
1894.66	194.5	19.18	2*n*	Gla
1900.38	195.7	19.71	4*n*	Espin

[Ma (*F. S.* **I**) . . . Ma (**X, XI, XIII, XV**) . . . H¹ . . . H (**IV**) . . . *Gr. Obsns.* 1840 . . . Ra (**XXIV**) . . . En (1518, 1674) . . . Δ (1195, 2195) . . . *Δ* (**I, II**) . . . Du . . . Flm . . . Bl (**V**) . . . WS . . . Gl . . . Sk² . . . Je (2450) . . . Glasenapp (**III**) . . . Do (3681) . . . *Annals Toulouse Obsy.* **III** . . . Espin (*Mon. Not.* **LXII**, 530) . . .]

48 17 **11326.** **H 3066.** "Quadruple." In trying to identify this, No. 11321 was measured. The angle of that does not agree with H, but nothing else found near. It may be identical with β 841 (No. 11343).

48 21 **11327.** **Σ 2838.** *Aquarii* 100. A very slow change in the distance from proper motion.

1829.47	185°.2	21″.65	3*n*	Σ
1866.61	184.6	20.81	3*n*	*Δ*
1878.71	184.0	20.32	2*n*	Cin
1890.56	183.7	19.75	2*n*	Gla
1905.54	184.7	19.48	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**X, XI**) . . . Mh . . . Flm . . . Hd . . . WS² . . . Pt . . . *Δ* (1800) . . . *Δ* (**II**) . . . Cin⁵ . . . Cin⁶ . . . Glasenapp (**I**) . . . *Annals Toulouse Obsy.* **III** . . . β⁶ . . .]

48 23 **11328.** **H 3067.** In 1830 Herschel noted, "a strong suspicion of a small star," with an estimated distance of 4″, the magnitude of the suspected star being called 17. There is no other observation of this star until it was picked up independently by Aitken in 1904, and found to be a close pair. His measures are:

1904.60	164°.6	0″.66	3*n*	A	8.4 . . . 10.3

Of course this has nothing to do with the suspected star of Herschel. The magnitude of B would make it conspicuous with any distance of 3″ or 4″. (See No. 13593.)

(See p. 1084)

11329. **β 1213.** Discovered with the 18½-inch at Chicago, but not included in the catalogues of new pairs of that time. All the other measures are given. 48m 26s

B and C

1899.78	306°.0	0″.84	2*n*	A	9.1 . . . 9.7
1902.36	311.7	0.81	5*n*	Doo	9.5 . . . 10.2

A and B

1898.69	258°.9	63″.45	1*n*	A
1903.54	258.8	63.42	4*n*	Doo

[β (**XVII**) . . . β (3047)(*Pub. L. O.* **II** . . . A (3639) . . . Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**) . . .]

11330. **H 616.** (= **Σ 2839** *rej.*) The following are all the measures: 48 34

1879.77	274°.2	30″.90	1*n*	Cin	7.5 . . . 9.5
1882.71	275.1	31.01	1*n*	W	8.0 . . . 9.5
1905.60	275.1	30.41	2*n*	β	8.0 . . . 10.3

[H (**V**) . . . Cin⁶ . . . Wilson (Cin¹⁰) . . . β⁶ . . .]

11331. **Kr 56.** Noted as double in *A. G. Hels.* 48 36

1898.35	301°.7	4″.63	4*n*	Doo	9.0 . . . 9.7
1905.86	303.3	4.15	2*n*	Doo	

[β (3042)(*Pub. L. O.* **II**) . . . Doolittle (*Pub. Flower Obsy.* **I**) . . .]

11332–3. **Espin 142 and 143.** In trying to find these pairs, Doolittle ascertained that Espin's R. A. (*Mon. Not.* LXIII, 172) is 1h in error. Both stars are in 22h. 48 36

(See p. 1084)

11334. **Σ 2843.** The angle is slowly increasing, and the distance probably diminishing. 48 37

1831.91	133°.5	2″.36	3*n*	Σ
1836.44	133.3	2.19	4*n*	Σ
1857.91	136.9	2.40	1*n*	Se
1869.46	136.9	2.12	5*n*	*Δ*
1892.67	139.2	2.09	4*n*	Gla
1892.86	138.0	1.98	2*n*	Jones
1905.58	140.4	1.92	2*n*	β

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H¹ . . . H (**IV**) . . . Se . . . Wr . . . Ra (**XXV**) . . . *Δ* (1195) . . . *Δ* (**I, II**) . . . Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13) . . . Jones (*Proc. Haverford Coll. Obsy.* 1892) . . . Glasenapp (**II, III**) . . . *Annals Toulouse Obsy.* **III** . . . β⁶ . . .]

11335. **Σ 2841.** (= **H N. 14** = **Sh 333.**) Fixed. 48 39

1867.17	111°.2	22″.23	4*n*	*Δ*
1889.98	110.1	22.27	3*n*	Giacomelli
1892.15	109.8	22.24	4*n*	Gla
1896.29	110.6	22.58	6*n*	Coleman
1902.66	110.5	22.56	1*n*	Hu

[Ma (*F. S.* **I**) . . . Ma (**XI**) . . . H (**VII**) . . . Se . . . Ma (324) . . . Ra (**XXIV**) . . . Δ (1209) . . . *Δ* (**I, II**) . . . Giacomelli (**III**) . . . Glasenapp (**II, III**) . . . Coleman (*Mem. R. A. S.* **LIII**) . . . *Annals Toulouse Obsy.* **III** . . .]

11336. **Σ 2844** *rej.* The only measures are: 48 40

1903.74	258°.5	11″.16	2*n*	Es	8.0 . . . 10.0
1905.58	261.6	11.55	2*n*	β	7.8 . . . 10.2

[Espin (*Mon. Not.* **LXIV**, 680) . . . β⁶]

48m 55s **11338.** **H 3065.** The third star referred to by H is, 148°7 : 57″6. The only measure of AB is:

1904.82	132°8	39″63	1*n*	β⁶	7.5...11.5

48 59 **11339.** **Σ 2845.** The observations taken together show no motion since Struve.

1852.65	174°4	2″10	2*n*	Ma
1858.75	174.1	1.98	2*n*	Wr
1868.14	171.8	2.08	4*n*	Δ
1895.72	173.0	2.18	2*n*	Gla
1905.90	172.4	1.72	2*n*	β

[**Ma** (*F. S.* **I**)...Ma (**XI, XIII**)...H¹...H²...H (**IV**)...Wr...Flm...Big...Δ (**II**) ...β¹...Glasenapp (**III, IV**)...β⁶...]

49 ± **11340.** **H N. 131.** "Unidentifiable." This is undoubtedly H 3071. (See No. 11377.) Carefully looked for, and no other pair found (1873).

49 9 **11341.** **β 768.** This is a bright star (Gould 5.8m) closely following γ *Gruis.* It was suspected to be a close pair with the 6-inch at Mt. Hamilton in 1879. At the Sydney Observatory it was thought to be elongated in 90° in 1886. An examination with the 12-inch at the Lick Observatory in 1891, under favorable conditions, left the matter still in doubt, as no certain elongation could be seen. At all times the star was of course near the horizon, and it may not be double, but should be watched hereafter at favorable points of observation.

[β (**XI**)...β²...β (3114)(*Pub. L. O.* **II**)...Russell (*Mon. Not.* **XLVII**, 473)...]

49 21 **11343.** **β 841.** Discovered with the 15½-inch at the Washburn Observatory.

1888.19	193°6	2″06	2*n*	Com

Comstock measures another (place not given) "near β 841":

1887.87	172°7	2″23	1*n*	Com	9.0...10.5
1903.28	168.6	2.03	5*n*	Doo	9.3...10.8

The place of H 3066 is given by H, 21h 48m 17s; +53° 25′; it is described as "quadruple," and the angle of AB given 199°8. I could not find this in 1873 in the assigned place, nor later in 1904. There is little doubt of its identity with β 841 (see No. 11326).

[β (**XII**)...β⁴...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

49 26 **11344.** **See 461.** The other measures are:

1899.11	60°8	3″91	2*n*	Boothroyd
1899.72	60.6	3.60	1*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

49 36 **11345.** **Ho 173.** The later positions are:

1897.74	69°2	0″89	2*n*	Ho	9.0...9.5
1904.79	69.4	0.92	3*n*	Doo	

[Ho (2779, 3558)...]

11346. **β 75.** Discovered with the 6-inch. Probably a physical system. The components have a common proper motion: 49m 40s

Porter	0″164 in 232°4
Glasgow	0.203 in 209.1

The following are all the measures:

1875.45	34°3	1″20	4*n*	Δ
1882.68	34.0	1.23	1*n*	Perry
1888.68	37.8	1.29	2*n*	Lv
1891.73	39.1	1.15	3*n*	β
1891.78	40.5	1.34	3*n*	Maw
1894.69	40.2	1.12	5*n*	Sp
1895.75	37.0	1.14	3*n*	Lewis
1896.69	37.8	1.17	3*n*	Lv
1896.83	37.6	1.01	1*n*	Bowyer
1896.83	40.0	1.05	2*n*	Lewis
1897.79	39.3	1.27	1*n*	Morgan
1897.82	39.5	1.09	3*n*	A
1899.83	40.1	0.90	1*n*	Lewis
1900.06	42.2	1.00	7*n*	Bowyer
1900.11	39.9	1.09	3*n*	Bryant
1901.62	44.2	1.04	3*n*	Doo
1903.73	42.0	1.00	2*n*	Biesbroeck
1903.88	43.7	0.90	1*n*	Furner

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....β (3114)(*Pub. L. O.* **II**)...Δ (**I**)....Perry (*Eng. Mech.* **XXXVI**, 65)...Lv (*A. J.* 407)...Lv¹...Sp (**III**)...Maw (**I**)... Morgan (*A. J.* 439)...A (*A. J.* 429)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXI**, 486; **LXIII**, 403; **LXIV**, 805)...Biesbroeck...Doolittle (*Pub. Flower Obsy.* **II**)...]

11347. **OΣ 452.** No material change. 49 42

1869.61	177°5	1″05	5*n*	Δ
1885.67	180.7	1.14	3*n*	Per
1886.82	179.2	1.07	1*n*	HΣ
1898.48	180.9	1.17	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Da⁴...Δ (**I**)...WS²...Per...Per (2749)...Glasenapp (**III, V**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

11349. **A 302.** No other measures. 49 5

[A (3784)(*Bul. L. O.* No. 16)...]

11350. **β 693.** Discovered with the 18½-inch. Probably without change. The other measures are given: 49 5

1879.16	54°4	1″03	2*n*	Cin
1886.78	48.7	1.15	1*n*	LM
1893.82	57.9	1.43	1*n*	W
1894.81	49.7	1.06	7*n*	Com
1898.65	51.3	1.21	3*n*	Cogshall
1900.59	48.7	1.19	3*n*	Doo

[β (**X**)...β¹...Cin⁵...LM...Wilson (   )...Com (**X**)...Cogshall (*A. J.* 478)... Doolittle (*Pub. Flower Obsy.* **I**)...]

11352. **A 303.** No other measures: 50 4

[A (3784)(*Bul. L. O.* No. 16)...]

11353. **Ho 609.** There are large errors in some of the distances. 50 4

1893.28	356°4	1″84	2*n*	Ho
1904.74	175.5	2.37	3*n*	Doo
1904.87	354.6	3.47	1*n*	Lewis

[Ho (3558)...Lewis (*Mon. Not.* **LXVI**, 31)...]

$50^m\ 7^s$ **11354.** **Σ 2846.** C from H (IV); not in Σ. No change in AB.

A and B

1866.36	268°5	3″28	3*n*	Δ
1889.70	266.1	3.46	2*n*	Hl
1901.76	266.4	3.32	2*n*	Espin
1905.90	266.6	3.54	2*n*	β

The only measure of AC is:

1905.87 155°3 33″61 3*n* β

[Ma (*F. S.* I)...Ma (**XI, XIII, XV**)...H (**IV**)...Δ (**II**)...Flm...Gl...WS...WS^2...Sk^3...Hl (**II**)...Glasenapp (**V**)...Espin (*Mon. Not.* **LXIV**, 677)...Lewis (*Mon. Not.* **LXIV**, 805)...β^6...]

50 7 **11355.** From Battermann's catalogue in *Berlin Observations*, No. 8. The proper motion of this star is 0″231 in 141°2 (*A. G. Berlin*). The small star evidently has the same movement. The very faint star C has not been noted before.

AB	1903.38	160°9	1″48	3*n*	β^6	9.3... 9.4
AC	1903.38	298.8	21.85	3*n*	β^6	...15.0

The difference in declination of this and DM (14°) 4691, which is 67^s *p*, is:

1870.3	239″4	*A. G. Berlin*
1871.2	238.8	*A. G. Leipzig*
1903.36	236.12	β

50 21 **11357.** **S 800.** (= σ 734.) The smaller component is DM (61°) 2217; both stars in *A. G. Hels.* Probably unchanged.

1896.54	145°7	62″84	2*n*	Lv
1896.55	145.5	63.00	3*n*	Soulé
1904.49	145.7	62.50	2*n*	β

Espin notes two small stars, A*a* 280°8 : 19″8, and B*b* 43°3 : 22″4 (= Espin 144).

[Lv (*A. J.* 407)...Soulé (*A. J.* 410)...Espin (*Mon. Not.* **LXIII**, 172)...β^6...]

(See p. 1085)

50 24 **11358.** **A. G. 278.** Double in *A. G. Leiden.* Measures by β^6.

50 25 **11359.** **H 3072.** In DM 8.5 m.

1901.01 76°8 13″83 1*n* Espin (*Mon. Not.* LXIV, 679)

50 27 **11360.** **H 1704.** Distance much underestimated by H.

1902.65 317°5 5″43 2*n* β^6 11.2...11.3

50 29 **11361.** **OΣ (App) 226.** B is O. Arg. N. 23067. The proper motion of A is 0″049 in 199°9 (Schroeter). No relative motion.

1879.56	246°2	76″01	1*n*	β
1905.61	245.4	76.19	3*n*	β

[Δ (I)...β^3...Franz (2649)...β^6...]

11362. **OΣ 453.** (AC = **H** 3069.) The small star not in OΣ. No other measures. No change in AB. $50^m\ 31^s$

1870.02	268°2	0″7 ±	5*n*	Δ
1886.17	269.7	0.64	2*n*	Per
1898.48	270.5	0.67	3*n*	Hu

Hussey measures a pair of small stars 40′ *s* of OΣ 453:

1901.27 41°7 0″54 3*n* Hu 9.5...9.5

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...β^1...Per...Hu (*Pub. L. O.* **V**)...]

(See No. 11363)

11364. **OΣ 454.** Unchanged. Glasenapp measures a distant 10.8 m star, 263°4 : 43″04 (1895.64) 1*n*. 50 34

1867.62	277°9	7″05	4*n*	Δ
1881.68	277.7	7.15	1*n*	Ho
1898.63	278.9	7.08	3*n*	Hu

[Ma (**XI, XIII**)...Da^3...OΣ (**IX**)...Δ (**I**)...Per...Ho (2978)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

11365. **Ho 174.** Nothing since but the following: 50 41

AB	1893.72	154°4	7″29	1*n*	Ho
CD	1893.72	88.5	6.06	1*n*	Ho

[Ho (2779, 3234)...]

11366. **Σ 2858.** Fixed. 50 42

1866.38	164°2	14″83	3*n*	Δ
1905.72	163.5	14.77	1*n*	β

[Ma (**XI**)...Ma (*F. S.* **I**)...H (**V**)...Δ (**II**)...β^6...]

11367. **See 463.** The later measure gives: 50 49

1898.76 117°5 15″13 3*n* Bd 8.3...13.2

[See...(*A. J.* 431)...Boothroyd (*A. J.* 486)...]

11368. **H 3068.** "Very neat." The declination in H appears to be 10′ too small. 50 49

1878.75	288°7	10″64	2*n*	Cin	8.3...10.2
1892.67	283.5	10.80	2*n*	Gla	8.8...10.1

[H (**VIII**)...Cin^4...Cin^6...Glasenapp (**II**)...]

11369. **β 169.** Discovered with the 6-inch. The south star of a wide pair about 95″ apart. 50 49

1877.68	275°9	2″01	1*n*	Cin	8.6...8.7
1892.70	282.6	2.10	2*n*	Wilson	9.0...9.2
1893.81	279.6	2.26	1*n*	Sellors	9 ...9
1898.91	279.7	1.92	3*n*	Doo	9.2...9.2

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Cin^3...Cin^4...Sellors (3240)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* I)...]

11372. **OΣ 455.** No change. The components have a small common proper motion, 0″039 in 190°5 (Kustner). 50 56

1868.03	269°1	9″82	4*n*	Δ
1886.33	269.1	10.03	3*n*	Per
1898.62	269.7	10.01	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Δ (**I**)...Per...Hu (*Pub. L. O.* **V**)...]

$51^m\ 11^s$ **11376.** **OΣ 456.** No change since 1847.

1847.73	25°7	1″35	3*n*	OΣ
1867.85	30.3	1.51	4*n*	Δ
1886.81	29.4	1.60	1*n*	HΣ
1889.74	31.3	1.37	3*n*	Hl
1898.61	32.7	1.48	4*n*	Hu
1901.60	29.9	1.75	3*n*	Doo

Bigourdan measures two distant stars:

AC	1881.76	186°0	25″17	2*n*	Big	...10
AD	1881.76	283.2	36.12	2*n*	Big	... 9

[Ma (**XIII**)...OΣ (**IX**)...Da^3...Δ (I)...Big...Sk^2...Sk^5, p. 121...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

51 16 **11377.** **H 3071.** (= **H N. 131.**) Probably fixed. (See No. 11340.) The principal star has a proper motion of 0″033 in 205°7 (Battermann).

1877.79	319°3	20″30	1*n*	Cin	7.0...10.7
1904.63	321.3	19.02	2*n*	β	

[H^3...Cin^4...β^6...]

51 23 **11380.** **β 1214.** This quadruple was discovered with the 18½-inch in 1884, but not included in the Chicago catalogues. The 36-inch shows a faint star about 20″ from C in the direction of 285°, and also a 5″ pair of faint stars between AB and CD, with many small stars in the field. C is DM (33°) 4388. The later measures show no change.

A and B

1898.72	201°1	1″65	2*n*	A	9.2...10.5
1898.79	202.4	1.25	2*n*	β	8.4...10.2
1898.89	207.4	1.55	1*n*	Barnard	

C and D

1898.72	243°2	4″88	2*n*	A	10.0...10.8
1898.79	246.7	4.93	2*n*	β	8.5...11.2
1898.89	245.1	5.04	1*n*	Barnard	

A and C

1898.71	18°9	112″47	1*n*	A
1898.79	18.1	112.32	2*n*	β
1898.89	18.1	112.04	1*n*	Barnard

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3585)...]

51 27 **11382.** **OΣ (App) 225.** B is Lalande 42791. Unchanged.

1904.44	287°0	75″02	2*n*	β

[Δ (I)...β^6...]

51 36 **11383.** **H 3073.** The place given by Hu is erroneous in declination.

1900.65	13°7	23″28	1*n*	Hu	9.5... 9.6
1904.44	12.8	23.10	2*n*	β	8.5...10.7

[Hu (*Bul. L. O.* No. 44)...β^6...]

51 46 **11384.** **OΣ (App) 227.** The only other measure shows no change.

1905.60	32°8	78″46	2*n*	β

[Δ (I)...β^6...]

51 53 **11385.** **Σ 2847.** The angle in Σ is too small; no evidence of motion in the last forty years.

1867.96	303°9	1″11	4*n*	Δ
1876.90	302.4	0.91	1*n*	Sp
1879.23	302.3	1.09	9*n*	Cin
1884.72	304.5	1.26	2*n*	Per
1885.02	301.3	1.14	9*n*	Hl

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...Mh...Se...Se^3...OΣ (**IX**)...Hd...Δ (1195, 2195)...Δ (**I, II**)...Flm...WS^2...Sk^3...Pt...UL...Do (2303, 3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sp (**II**)...Per...Per (2749)...Cin^4...Cin^5...Cin^6...LM...Wilson (Cin^{10})...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Hl (*Wash. Obsns.* 1885 6)...Hl (**I, II**)...T (2991, 3185)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

11386. **Lewis 37.** Approximate place. The earlier measure is: 52^m · ·

1895.73	85°1	2″13	1*n*	Lewis

[Lewis (*Mon. Not.* **LVI**, 367; **LIX**, 424)...]

11387. **Σ 2848.** (= **H III. 74 = Sh 335.**) Fixed. 52 1

1866.49	55°4	10″52	4*n*	Δ
1891.16	55.1	10.61	4*n*	Gla
1896.61	56.3	10.11	3*n*	Coleman
1902.66	55.8	10.74	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)...Ma (**IX, X, XI**)...H^1...H^2...H (**V, VII**)...Bp...Da^3...Se...Wr...Ra (**XXIII**)...Ba (**II, IV**)...Du...Δ (1125)...Δ (**I, II**)...Pt...O. Stone (2201)...Cin^6...Wilson (Cin^{10})...Scott (*Brit. Ast. Ass'n* **V**. 75)...Maw (I)...Glasenapp (**II, III**)...Chofardet (3450)...Coleman (*Mem. R. A. S.* **LIII**)....*A. G. Leipzig*, p. 250....*Annals Toulouse Obsy* **III**.....Lau (4078)...]

11388. **Σ 2849.** The position-angle in Struve seems to be too large. There is no evidence of motion in the last fifty years. 52 4

1830.42	272°4	1″09	3*n*	Σ
1842.72	264.7	1.30	2*n*	Ma
1864.64	265.0	1.37	3*n*	Δ
1887.09	263.3	1.66	3*n*	HΣ
1887.84	262.8	1.63	2*n*	Hl
1893.65	262.5	1.64	2*n*	Gla
1895.73	264.0	1.41	2*n*	Lewis
1899.72	264.1	1.48	6*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Δ (1475)...Flm...Sk^2...Δ (**II**)...Hl (**II**)...Glasenapp (**III**)...Lewis (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXI**, 486; **LXVI**, 31)...HΣ (**XII**)...]

11389. **H 3074.** "Very neat." No motion. These are all the measures: 52 6

1879.56	293°5	2″30	2*n*	Cin	9.0... 9.5
1886.84	293.4	2.33	2*n*	LM	
1894.62	296.4	2.53	2*n*	Gla	9.8...10.0
1903.68	294.5	2.22	4*n*	Doo	8.3... 9.1

[Cin^5...LM...Glasenapp (**III**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11390. **OΣ 537.** In the field with OΣ 458. There is an error of 180° in the angle of OΣ as printed. Probably without relative change. 52 10

1856.73	193°5	2″57	1*n*	OΣ
1876.69	199.2	1.99	4*n*	Δ
1878.65	201.5	2.16	2*n*	β
1898.61	198.9	1.94	3*n*	Hu

[OΣ (**IX**)...OΣ (*Mon. Not.* **XX**, 12)...Δ (**I, II** p. 617)...β^1...β (2048)...Hu (*Pub. L. O.* **V**)...]

52^m 22^s **11391.** **OΣ 457.** No sensible change.

1867.98	246°4	1″45	4*n*	Δ
1898.62	246.2	1.30	4*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

52 25 **11392.** **H 3075.** The only measure is:

1905.72	306°0	7″03	4*n*	Doo	10.3...10.9

52 29 **11393.** **A. G. 279.** Double in A. G. Measures from *A. G. Leipzig*, p. 250.

52 34 **11394.** **H 3075.** The only measure is:

1905.72	249°6	34″19	4*n*	Doo	8.0...10.1

52 36 **11396.** **Sh 336.** B is W^1 XXI. 1203. There is some change in the distance from proper motion. The components are DM (5°) 4915 and 4913.

1823.77	226°0	105″86	1*n*	Sh	8 ...11
1881.56	224.9	102.17	3*n*	β^4	8.0... 8.5
1901.67	224.6	100.86	2*n*	β^5	7.5... 8.1

52 40 **11397.** **OΣ 458.** Very little, if any, change in AB.

1851.75	348°8	0″71	7*n*	OΣ
1870.76	353.3	0.82	6*n*	Δ
1878.65	351.9	0.86	2*n*	β
1889.74	352.6	0.81	3*n*	Hl
1898.62	355.4	0.76	4*n*	Hu
1901.59	352.0	0.83	3*n*	Doo

The faint star, C, is not in OΣ. The only other measure of this is:

1905.80	29°3	22″68	2*n*	β

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...β^1... Hl (**II**)...Hu (*Pub. L. O.* **V**)... β^6...Doolittle (*Pub. Flower Obsy.* **II**)...]

52 42 **11398.** 11 *Piscis Australis.* **O. Stone 56.** No motion. The other measures are:

1878.68	37°3	12″05	2*n*	Cin	6.4...10.5
1885.73	38.0	11.10	1*n*	W	7.5...10.0
1896.84	36.7	12.16	2*n*	See	7.7...11.5

[Cin^4...Cin^5...Cin^6...Wilson (Cin^{10})...See (3496)...]

52 47 **11400.** "Double, Cl. I" in *Cordoba Zones.* Both stars appear to be given in the *General Catalogue*, Nos. 30078 and 30079. No other measures.

[Innes (*Mon. Not.* **LXII**, 478)...]

52 59 **11401.** **H 3078.** "Very neat." In *Harvard Zones* distance 6″. No measures.

52 59 **11402.** **H 950.** No DM star in this place, and no 8m anywhere near. Looked for with the 40-inch in 1904; many small pairs near, but none answering the description in H.

53 4 **11404.** **Hu 772.** With another measure (*Bul. L. O.* No. 65) the mean is:

1904.53	318°9	0″23	2*n*	Hu

11405. **A 304.** No other measures. 53^m 4^s

[A (3784)(*Bul. L. O.* No. 16)...]

11406. **H 3079.** There is an error of about 2^m in the R. A. of Herschel. Identified and measured. 53 29

1904.44	71°8	9″74	1*n*	β^6	9.4...9.5

11407. **Espin 145.** The only other measure is: 53 30

1906.04	206°0	2″76	2*n*	Doo	9.1...10.0

[Espin (*Mon. Not.* **LXIII**, 173)...]

11408. **A 305.** No other measures. 53 33

[A (3784)(*Bul. L. O.* No. 16)...]

11409. **β 275.** Discovered with the 9.4-inch at the Dartmouth College Observatory. A difficult pair with small apertures. The observations do not show the change which would be expected in a pair of this class. All the other measures are given here: 53 38

1885.54	1°1	0″43	3*n*	HΣ
1889.70	5.5	0.27	7*n*	Sp
1890.68	3.8	0.39	3*n*	β
1898.67	182.4	0.52	3*n*	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (3048)(*Pub. L. O.* **II**)...Δ (**I**)...Sp (**III**)... A (3585)...HΣ (**XII**)...]

11410. η *Piscis Australis.* **β 276.** Discovered with the 6-inch. A fine, easy pair, and visible with a much smaller aperture. Probably unchanged. The magnitude in Cord. G. C. is 5.7. The *Cape Catalogue* gives a proper motion of 0″026 in the direction of 270°. It is very probable that this motion belongs to both stars. 53 56

1879.24	113°4	1″69	3*n*	Cin
1884.70	116.2	1.64	3*n*	W
1885.86	118.1	1.81	2*n*	Hl
1887.79	115.7	1.81	2*n*	Hl
1888.78	118.5	1.61	3*n*	β
1888.89	113.3	1.50	2*n*	Lv
1892.67	112.4	1.16	2*n*	Gla
1895.04	111.4	1.71	11*n*	Scott
1897.02	117.3	1.84	3*n*	See
1900.00	115.9	1.78	9*n*	Scott
1901.15	115.0	1.80	5*n*	Doo
1903.64	115.4	1.72	5*n*	Jouffray

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β (2875)(*Pub. L. O.* **II**)...Cin^3...Cin^4... Cin^5....Cin^6....Wilson (Cin^{10})....Hl (**II**)....LM....Lv^1....Scott (*Brit. Ast. Ass'n* **V**, 75; **VI**, 250, 368)(*Mon. Not.* **LIX**, 427; **LXIV**, 52)...See (3496)... Glasenapp (**II**)...Solá (3679)...Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)... Doolittle (*Pub. Flower Obsy.* **I**, **II**)...]

11411. **H 1709.** In DM 8.8m. 53 59

1901.66	316°7	9″20	2*n*	Es	8.9...12.0

[Espin (*Mon. Not.* **LXII**, 533)...]

11412. **H. C. Wilson 25.** From Wilson (Cin^{10}). There is no such pair in or near this place. All the stars are much smaller than 8m. The description is not unlike Σ 2856, which is 5^m *f* and 3° *n*. 54 :

[β^5...]

$54^m\ :^s$ **11413.** **Hn** 168. No other measures.

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

54 17 **11416.** **Σ** 2850. Very little, if any, change.

1868.20	258°7	2″88	4*n*	*Δ*
1887.12	260.5	2.85	3*n*	HΣ
1900.18	261.7	3.08	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)...*Δ* (**II**)...Glasenapp (**III**)...HΣ (**XII**)...Lewis (*Mon. Not.* **LXVI**, 31)...]

54 22 **11419.** **Hu** 773. With another measure the mean is:

1904.53	323°0	4″67	2*n*	Hu	9.0...11.3

[Hu (*Bul. L. O.* No 65)...]

54 44 **11421.** **Ho** 468. The only later position is:

1897.83	345°0	3″97	1*n*	See	7.5...10.8

[Ho (3234)...See (3496)...]

55 0 **11422.** **Howe** 59. (AC = **H** 5524.) B discovered by Howe at the Cincinnati Observatory. No change in AB.

A and B

1878.63	270°5	8″94	1*n*	*β*
1884.15	271.5	8.88	3*n*	Wilson
1900.38	270.6	9.25	3*n*	Doo
1901.67	271.2	9.13	2*n*	*β*

The only measure of the Herschel star is:

1901.67	292°1	101″86	2*n*	*β*

[Cin^4...β^1...Wilson (Cin^{10})...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

55 7 **11424.** **Hu** 774. With another measure the mean is:

1904.53	153°0	0″17	2*n*	Hu	7.5...7.8

[Hu (*Bul. L. O.* No. 65)...]

55 12 **11426.** **Hu** 775. With another measure the mean is:

1904.53	220°8	2″18	2*n*	Hu	8.7...11.2

[Hu (*Bul. L. O.* No. 65)...]

55 13 **11427.** **Σ** 2851. (= **S** 801.) The proper motions from Battermann are:

A = 0″088 in 90°0
B = 0.071 in 124.3

No relative motion.

1867.46	121°1	18″94	3*n*	*Δ*
1890.56	121.6	18.22	2*n*	Gla
1902.65	121.1	19.09	2*n*	Hu

[H (**V**)...Ma (*F. S.* **I**)...Mh...*Δ* (**II**)...Glasenapp (**I**)...Cin^5...Solá (3497)... *Annals Toulouse Obsy.* **III**...]

55 14 **11428.** 20 *Pegasi.* **H** 289. (= **H** 5525.) The change is due to the proper motion of A:

Auwers	0″063 in	142°7
Greenwich	0.068 in	136.9

The following are all the measures:

1878.95	325°5	51″06	3*n*	*β*	6...11.4
1901.81	324.4	52.91	2*n*	*β*	

[β^1...β^3...β^5...]

11430. **A** 778. With later measures (*Bul. L. O.* No. 61) the means are: $55^m\ 35^s$

1904.53	208°8	0″34	3*n*	A	8.8... 9.6
1904.53	233.3	6.63	3*n*	A	...15.2

11432. **A** 306. No other measures. 55 43

[A (3784)(*Bul. L. O.* No. 16)...]

11433. **OΣ** (App) 228. The proper motion of the larger star is given: 55 51

Porter	0″145 in	163°2
Boss	0.160 in	165.1
Paris	0.171 in	158.1

This explains the increasing distance of B:

1896.61	27°2	75″82	4*n*	Soulé	
1901.56	27.3	75.63	2*n*	*β*	8.1...8.7

There is a 12m star near A:

1901.60	157°9	25″66	1*n*	*β*

[*Δ* (**I**)...Soulé (*A. J.* 410)...β^5...]

11434. 29 *Aquarii.* **S** 802. (= *σ* 738. Probably fixed. The common proper motion is, 0″031 in 308°0 (Auwers). 55 52

1866.72	243°5	3″74	3*n*	*Δ*	7.0...7.2
1879.83	243.4	3.63	3*n*	Cin	
1890.56	244.1	3.81	2*n*	Gla	6.9...7.1
1896.72	243.6	3.92	2*n*	Hu	
1903.72	242.1	3.90	2*n*	Scott	
1903.77	243.5	3.95	6*n*	Jouffray	

[J^2...J^3...Mh...Wr...Ra (**XXI**)...*Δ* (**I**)...β^1...Cin^3...Cin^4...Cin^5...Cin^6... Wilson (Cin^{10})...Lv^1...T (2991)...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n.* **V**. 75)(*Mon. Not.* **LXIV**, 52)... Hu (*A. J.* (397)... See (3496)... Solá (3497)... Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

11435. **A** 779. With two other measures (*Bul. L. O.* No. 61) the mean is: 56 2

1904.53	279°4	0″44	3*n*	A	8.0...9.2

11436. **Ho** 175. Ho mentions a 12m star, 284°0 : 32″7. 56 3

1895.69	305°9	0″88	2*n*	Ho
1904.61	308.8	1.08	3*n*	Doo

[Ho (2779, 3558)...]

11437. **H** 951. H's first estimate of distance was 10″, and later only 3½″, from which he inferred motion in a few years. The later measures do not show any material change. 56 6

1873.49	87°3	8″90	1*n*	*Δ*	9.0... 9.5
1881.50	85.7	9.43	3*n*	*β*	8.7... 9.0
1903.50	79.5	9.61	2*n*	*β*	9.0...10.0

H (**IV**)...*Δ* (**I**)...β^4...β^6...]

56^m 13^s **11438.** **See 464.** Discovered by Cogshall, but in 1899 he was unable to find it. There is some error in the place. It is called SD (17°) 6423 in the Lowell Catalogue, but that star (= Hu 283) is 10′ *s* of the place given, and is a pair of a different class.

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

56 15 **11440.** **Ho 176.** Apparently unchanged.

1896.74	181°8	0″82	2*n*	Ho
1899.67	183.9	0.93	2*n*	Bowyer
1904.78	188.3	1.11	4*n*	Doo

[Ho (2779, 3558)...Bowyer (*Mon. Not.* **LX**, 514)...]

56 17 **11441.** **Σ 2852.** No change.

1867.04	172°9	7″57	3*n*	*Δ*
1894.66	171.8	7.78	2*n*	Gla
1905.64	172.8	7.65	1*n*	β

[H (**V**)...Ma (*F. S.* I)...Ma (**XI**)...*Δ* (**II**)...Glasenapp (**III**)...β^6...]

56 33 **11442.** **H 1714.** The only measure is:

1900.75	252°6	16″68	1*n*	Es	8.6...8.8

[Espin (*Mon. Not.* **LXIV**, 679)...]

56 34 **11443.** **Ho 610.** Ho notes two distant stars, 329°: 31″, and 284°: 34″. The only other measures of the close pair are:

1902.15	239°9	0″67	5*n*	Doo
1904.80	242.4	0.82	2*n*	Lewis

[Ho (3558)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...Lewis (*Mon. Not.* **LXVI**, 31)...]

56 37 **11444.** **Ho 469.** "A 13 m star 50″ *sf.*"

1900.82	30°8	0″81	2*n*	A

[Ho (3234)...A (*Bul. L. O.* No. 11)...]

56 54 **11446.** **Σ 2853.** Fixed.

1867.88	187°7	3″67	4*n*	*Δ*
1879.73	187.0	3.85	1*n*	Do
1905.66	188.1	3.21	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H (IV)...*Δ* (II)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...β^6...]

56 59 **11447.** **A 307.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

57 1 **11448.** **H 1716.** This is closely *f* the 8.3 m star, DM (50°) 3522. The only measures are:

AB	1903.31	88°8	5″95	2*n*	β^6	11.0...11.0
AC	1903.31	306.1	6.21	2*n*	β^6	...11.3

There is a 16 m star near B, 166°3 : 5″0.

57 4 **11449.** **H 3085.** "Triple." The distance of the smaller star is much underestimated by H. Identified and measured:

AB	1904.53	328°1	20″50	2*n*	β^6	9.6...11.5
AC	1904.61	284.6	46.70	1*n*	β^6	13.0

11450. **See 465.** Later measures give: 57^m 5^s

1899.70	192°1	2″42	3*n*	Cg	7.2...13.5

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11451. **Ho 177.** No change. 57 7

1897.01	108°0	7″66	4*n*	Ho
1904.66	110.7	7.73	3*n*	Doo

[Ho (2779, 3558)...]

11456. **H 952.** H (V) 357°2 : 12″ : 9...12. In DM 9.0. 57 39

11457. **H 1719.** "A third star 12 m from B 4″; also a fourth." 57 39

1905.78	221°2	9″09	1*n*	β^6

The other stars referred to are 12.5 m, 268°2 : 15″9; and 12.0 m, 145°4 : 30″9.

11458. **OΣ 459.** No change. This is H 1717. 57 51

1866.07	196°2	10″56	3*n*	*Δ*
1898.62	195.6	10.67	3*n*	Hu

[OΣ (**IX**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V.**)...]

11459. **β 694.** *Lacertae* 4. B. A. C. 7681. Discovered with the 18½-inch. The 36-inch shows a 13 m star, 328°1 : 24″1, and a 13.5 m, 277°3 : 27″1. In B. A. C. 6 m, Argelander 6.5 m. The later measures show no motion. 58 6

1885.57	354°2	0″60	2*n*	HΣ
1891.72	358.5	0.64	3*n*	β
1892.98	353.8	0.59	5*n*	Sp
1905.68	354.2	0.64	3*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...HΣ (**XII**)...Sp (**III**)...Do (3681)...]

11460. **See 467.** Smaller distance in the later measures. 58 25

1899.23	118°8	8″33	2*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11462. **Σ 2854.** **(= S 803.)** No change. 58 32

1866.19	82°7	2″84	3*n*	*Δ*
1892.81	84.4	2.70	2*n*	Gla
1904.79	84.5	2.64	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...Da^1...*Δ* (1209)...*Δ* (**I, II**)...WS^2...Jones (*Proc. Haverford Coll. Obsy.* 1892)....Glasenapp (**II**)....*A. G. Leipzig*, p. 211....*Annals Toulouse Obsy.* **III**...Bowyer (*Mon. Not.* **LXVI**, 31)...]

11463. **β 695.** Discovered with the 18½-inch. No sensible change. 58 33

1885.54	144°8	2″93	2*n*	HΣ	
1891.71	145.8	2.91	2*n*	β	8.3...10.8
1898.70	146.9	3.11	3*n*	A	7.9...11.0
1904.56	148.1	3.04	2*n*	β	

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...A (3585)...HΣ (**XII**)...β^6...]

11464. **β 696.** Discovered with the 18½-inch. Apparently fixed relatively. The *s* star of a small triangle. The *Berlin* 58 43

A. G. Catalogue gives this star a proper motion of 0″.092 in the direction of 206°.0. Obviously the movement of both stars is the same.

1877.32	355°.1	0″.50	2*n*	Δ
1878.21	353.8	0.65	2*n*	β
1883.80	354.0	0.5	1*n*	Perry
1889.85	361.9	0.5±	2*n*	Sp
1893.70	354.8	0.52	1*n*	W
1894.57	361.1	0.5±	3*n*	Sp
1899.49	352.8	0.50	3*n*	A
1901.46	356.3	0.56	3*n*	Doo

Doolittle measures a distant 9m star:

1900.80	317°.2	59″.48	1*n*	Doo

[β (**X**)...β^{1}...Δ(**I**)...Perry (*Eng. Mech.* **XXXVIII,** 192)...Sp (**III**)...Wilson ( ) ...A (3639)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

$59^{m}\ 5^{s}.8$ **11465-66. H 290 and H 291.** "Two elegant double stars in the field together." This vicinity was swept over with the 40-inch in 1902, but nothing found answering the description.

59 9 **11468. Σ 2855.** The principal star has a very small proper motion.

1828.84	295°.7	27″.52	4*n*	Σ
1867.01	297.9	26.92	3*n*	Δ
1893.71	298.7	26.87	2*n*	Gla
1902.66	299.8	26.64	2*n*	Hu
1904.60	299.6	26.46	2*n*	β

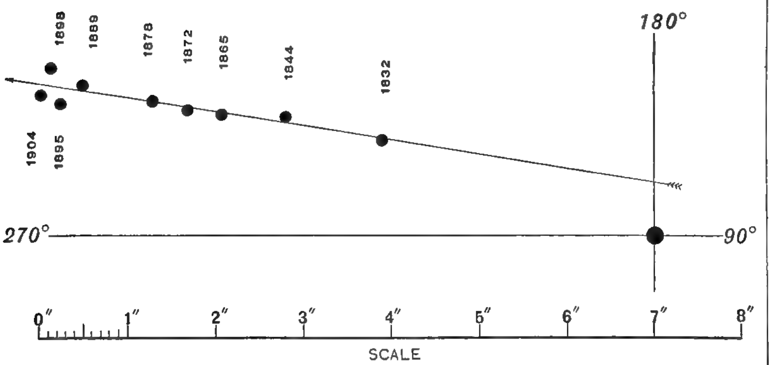
[Ma (*F. S.* **I, II**)...Ma (**X, XI, XIII**)...Flm...Δ (**II**)...Pt...Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**...β^{6}...]

59 16 **11469. H 953.** These are the only measures:

1903.52	105°.3	21″.44	3*n*	β^{6}	6.6...11.5
1904.66	104.4	21.14	2*n*	Espin	6.8...12.5

59 17 **11470. H 3087.** In another observation the magnitudes are given, 9...11-12. In DM 8.5.

59 26 **11471. Σ 2860.** Change from proper motion. Assuming B to be stationary, the principal star has an annual movement of about 0″.055. At one time the components were only 0″.6 apart.



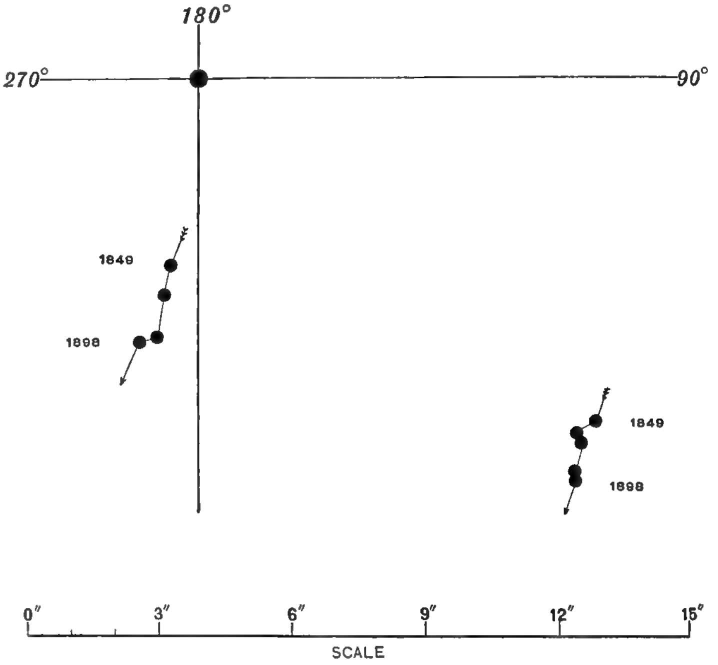
Σ 2860

1832.30	250°.8	3″.32	3*n*	Σ
1844.43	252.4	4.45	2*n*	Ma
1865.17	254.6	5.16	8*n*	Δ
1872.71	255.2	5.53	3*n*	Δ
1878.54	255.1	5.96	2*n*	β
1889.73	255.4	6.76	2*n*	Hl
1895.81	257.4	6.94	2*n*	Collins
1898.07	254.6	7.17	4*n*	Doo
1904.56	257.2	7.19	2*n*	β

There is a 13m star, 99°.2 : 27″.4 (1904).

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**IV**)...Flm...Δ (1573)...Δ (**II**)...Bl (**V**)... Pt...de Ball (2753)...Big...β^{1}...Hl (**II**)...Collins (*A. J.* 378)...Doolittle (*Pub. Flower Obsy.* **I**)...β^{6}...]

11472. OΣ 460. The change is due to a small proper motion in A. The following are all the measures: $59^{m}\ 32^{s}$



OΣ 460

A and B

1849.69	352°.2	5″.78	3*n*	OΣ
1877.80	351.8	6.71	1*n*	β
1886.82	351.7	8.05	1*n*	HΣ
1898.62	348.2	8.30	4*n*	Hu

A and C

1849.69	49°.1	15″.95	3*n*	OΣ
1866.53	46.7	15.77	1*n*	Δ
1877.80	46.3	16.04	1*n*	β
1886.82	43.6	16.51	1*n*	HΣ
1898.62	42.9	16.81	4*n*	Hu

[Ma (**XIII**)....OΣ (**IX**)....Δ (**I**).....β^{1}....β (2033)....Hu (*Pub. L. O.* **V**).... HΣ (**XII**)...]

11475. Σ 2856. Fixed. 59 48

1866.03	200°.6	1″.30	2*n*	Δ
1887.84	202.9	1.20	2*n*	Hl

1891.73	197°.4	1″.20	2*n*	Collins
1892.79	204.7	1.35	2*n*	Gla
1902.66	198.9	1.34	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...H (**V**)...Se...Δ (**II**)...WS²...Flm...Collins (*Proc. Haverford Coll. Obsy.* 1891)...Glasenapp (**II**)...Hl (**II**)...]

$59^{m}\ 49^{s}.5$ **11476.** **Hd 169.** Measures by β⁴. Nothing later.

59 59 **11477.** 15 *Cephei.* **OΣ 461.** (ACDEF = **OΣ (App) 229.**) No material change in the relative positions of these stars. The proper motion of the principal star is 0″.087 in 91°.3 (Auwers).

A and B

1871.15	297°.4	10″.90	6*n*	Δ
1898.61	298.9	11.12	3*n*	Hu
1905.80	297.5	11.23	3*n*	β

A and C

1885.92	39°.2	89″.85	4*n*	Eng
1899.69	39.2	89.91	2*n*	Hu
1905.80	39.2	89.72	2*n*	β

A and E

1884.10	37°.6	236″.28	4*n*	Franz

The 40-inch shows another companion to A, 13.5m, not previously seen:

A*a*	1905.80	334°.0	18″.34	3*n*	β

[OΣ (**IX, X**)...Wn (1738)...Flm...Δ (**I** pp. 209, 269)...Renz (*Bul. St. P. Acad.* 1892)...Franz (2650)...Engelhardt (2785)(**II**)...Hu (*Pub. L. O.* **V**)...β⁶...]

0 1 **11479.** **Hu 776.** With a later measure (*Bul. L. O.* No. 65) the mean is:

1904.56	350°.5	0″.28	2*n*	Hu	9.2...9.8

0 13 **11480.** **H 1724.** "Places ill-determined this sweep." Identified and measured:

1905.74	225°.2	13″.85	1*n*	β⁶	9.6...9.7

0 15 **11481.** **Σ 2857.** Fixed.

1865.22	113°.5	19″.81	3*n*	Δ
1879.64	112.1	19.80	1*n*	Cin
1892.85	113.0	19.71	2*n*	Gla
1902.66	113.4	19.98	2*n*	Hu

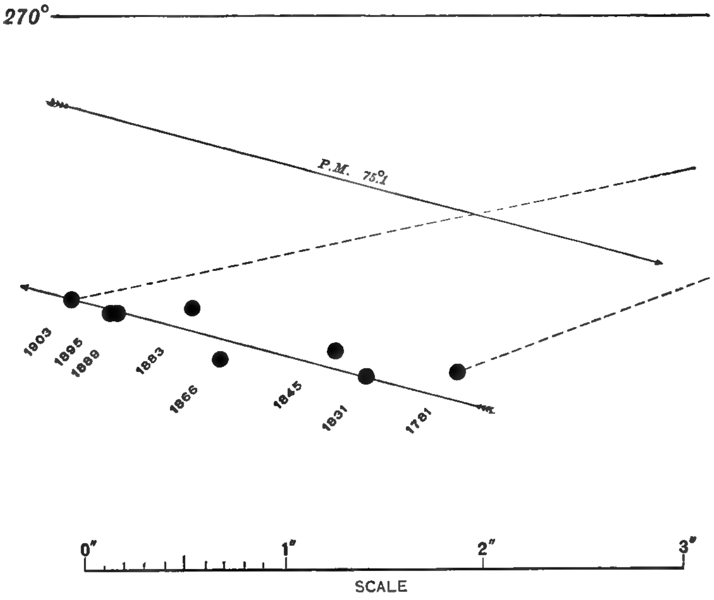
[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**VII**)...Δ (**II**)...Cin⁵...Glasenapp (**II, III**)...*A. G. Leipzig*, p. 250....*Annals Toulouse Obsy.* **III**...]

0 18 **11483.** ξ *Cephei.* **Σ 2863.** (= **H II. 16** = **Sh 337.**) This appears to be a system of the 61 *Cygni* type, the change being due to the slightly differing proper motion of the components. The movement of A from meridian positions is given:

Auwers	0″.195 in 70°.2
Porter	0.197 in 70.4
A. G. Hels.	0.207 in 71.8
Paris	0.254 in 75.1

The apparent annual motion of the companion with reference to A is about 0″.021 in the same direction. The following measures are sufficient to show the relative change in the last hundred years:

1781.16	290°.3	5″.00	1*n*	H
1831.77	288.9	5.60	3*n*	Σ
1845.85	287.2	5.70	7*n*	Ma
1866.13	286.0	6.28	12*n*	Δ
1883.35	283.5	6.34	5*n*	En
1889.74	283.0	6.71	3*n*	Hl
1895.89	282.9	6.75	2*n*	Coleman
{1900.37	281.9	6.91	3*n*	Doo
{1905.77	281.9	6.93	3*n*	β



ξ Cephei. Σ 2863.

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H¹...H (**IV**)...Mh...Bp...*Gr. Obsns.* 1840...*Durham Obsns.* 1846–48...Wr...Du...Flm...WS...Gl...Sk²...Pk...Δ (*Mem. Accad. Sci.*)...Δ (1195, 1573)...Δ (**I, II**)...Do (3023, 3681)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Goldney (2257)...Je (2450)...En (2678)...de Ball (2750)...See (*Beob. Berlin*, No. 6, 1892)...Hl (**II**)(*Proc. Haverford Coll. Obsy.* 1891–2...Glasenapp (**II, III**)...Maw (**I**)...Collins (*A. J.* 378)...Espin (*Brit. Ast. Ass'n.* **III**, 228)...Coleman (*Mem. R. A. S.* **LIII**)...Doolittle (*Pub. Flower Obsy.* **I**)....*Annals Toulouse Obsy.* **III**....Thiele (3837)....Sk⁵....β⁶...]

11484. **Σ 2859.** Fixed. $0^{m}\ 19^{s}$

1869.06	339°.9	3″.30	4*n*	Δ
1893.66	342.1	3.56	2*n*	Gla
1905.79	340.9	3.33	1*n*	β

[Ma (*F. S.* **I**)....Ma (**X**)...Δ (**II**)....Glasenapp (**III**)....*Annals Toulouse Obsy.* **III**...Lewis (*Mon. Not.* **LXVI**, 31)...β⁶...]

11485. **H 1721.** Noted as double in *A. G. Cambridge.* 0 20
The last measure is from the Kirkwood Observatory.

1879.73	277°.6	8″.28	2*n*	OΣ	7.5...8.8
1884.70	279.0	8.45	2*n*	HΣ	
1903.91	275.6	8.84	3*n*	Howard	

[OΣ (**X**)...Cin⁵...HΣ (**XII**)...]

$0^m\ 22^s$ **11486.** Σ 2861. Fixed.

1865.98	221°.7	7″.00	3*n*	Δ
1893.64	221.5	7.01	2*n*	Gla
1905.79	221.2	7.17	1*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H^1...H (**VII**)...Bp...Se...Wr...Ra (**XXIII**)...Ba (**II**)....Du....Δ (1209)....Δ (**I, II**)....Glasenapp (**III**)....Chofardet (3450).... *Annals Toulouse Obsy.* **III**...β^6...]

0 22 **11487.** H 1722. The only measure is:

1905.79	46°.7	17″.33	1*n*	β^6	9.0...10.7

0 50 **11489.** Howe 60. No motion.

1885.72	153°.2	2″.52	2*n*	W	8.0...9.2
1896.80	150.3	2.63	2*n*	See	7.8...9.8

[Cin^3...Cin^4...Wilson (Cin^{10})...See (3496)...]

0 57 **11490.** Σ 2862. Without material change. The proper motion is 0″.094 in 40°.9 (*A. G. Nico.*).

1866.54	103°.0	2″.45	3*n*	Δ
1886.79	101.0	2.56	2*n*	LM
1897.81	101.4	2.24	5*n*	Coleman
1902.66	100.6	2.43	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...H (**V**)....Mh...Se...Se^3...Wr...Ra (**XXIV**)? ...Du...LM...Cin^4...UL...Δ (1209)...Δ (**I, II**)...Glasenapp (**II**)...T (3185) ....Collins (*A. J.* 378)....Solá (3497)....Knorre (3632)....*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

1 2 **11491.** β 474. Discovered with the 6-inch. No change.

1891.71	346°.6	16″.42	3*n*	β
1902.40	344.8	16.26	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β^1...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

1 2 **11492.** A 183. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

1 5 **11493.** A 407. A 11 m star, 58° : 13″. No other measures.

A (*Bul. L. O.* No. 29)...]

1 16 **11496.** Ho 611. No change since the first measure.

1904.76	84°.3	17″.53	3*n*	Doo

[Ho (3558)...]

1 27 **11499.** 19 *Cephei.* β 697. Discovered with the 18½-inch. This star has a proper motion of 0″.081 in the direction of 114°.0 (Auwers). The last measure given is photographic.

1891.71	94°.4	19″.80	3*n*	β
1898.58	93.1	20.18	2*n*	β
1899.77	93.2	20.09		Gr. Obsy.

β (**X**)....β^1....β (3114)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**)....Greenwich Obsy. (*Mon. Not.* **LX**, 519)...]

11500. β 990. Discovered with the 18½-inch in the course of an examination of Σ 2879, and the vicinity, for the purpose of seeing whether there was any other pair to which certain discordant measures, credited to Σ 2879, might belong. These measures are as follows: $1^m\ 32^s$

1840.61	129°.7	0″.91	1*n*	OΣ
1856.93	130.5	0.5	1*n*	Secchi

There has been no material change in either angle or distance of Σ 2879 since the first measures, and therefore that could not have been the star observed. It will be seen that the measures fairly well describe β 990, and there is at least a probability that they belong to that pair. It is a much more difficult double than Σ 2879 (No. 11569). The other measures are:

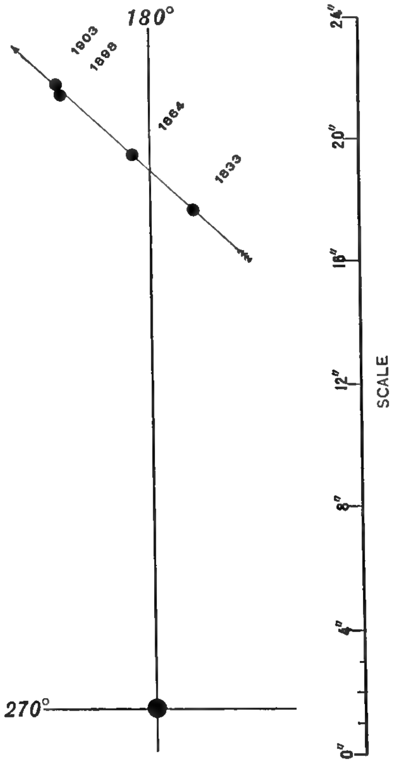
1891.72	124°.9	0″.50	3*n*	β
1898.49	121.7	0.51	2*n*	Doo

[β (**XIII**)...β^3...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11501. H 1729. Only this since H: 1 38

1900.91	98°.3	7″.77	2*n*	Espin (3717)

11504. Σ 2865. (= S 804.) Rectilinear motion. The measures give for the the most probable proper motion of A, 0″.088 in the direction of 47°.2, assuming B to be stationary. Furner and Storey find a little smaller value from meridian positions, but it is very probable that the first, based on micro- 1 45



Σ 2865.

meter measures with an interval of 70 years is substantially correct.

1833.38	175°.1	16″.36	2*n*	Σ
1864.96	181°.8	18.17	6*n*	Δ
1898.38	188.2	20.37	2*n*	Doo
1903.60	188.5	20.78	4*n*	β

[Ma (*F. S.* **II**)...H (**V**)...Δ (1475)...Δ (**II**)...Flm. .HΣ (**XII**)...Do (3799)... Furner and Storey (*Mon. Not.* **LXIV**, 449)...Doolittle (*Pub. Flower Obsy.* **I**) ...Lau (4078)...β^6...]

$1^m\ 46^s$ **11505.** **Ho 612.** The only other position is:

1904.77	67°.3	25″.84	3*n*	Doo

[Ho (3558)...]

1 49 **11506.** **OΣ 462.** Probably unchanged.

A and B

1869.83	332°.8	1″.48	6*n*	Δ
1880.84	335.2	1.12	2*n*	β
1886.80	329.3	1.52	2*n*	HΣ
1898.66	330.0	1.29	3*n*	Hu

A and C

1879.75	31°.8	7″.07	3*n*	β
1898.66	30.4	7.82	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...β^1...β^3...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

1 57 **11507.** **A 308.** No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

1 59 **11508.** **See 469.** Cogshall found it single, or very doubtful, in 1899.

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

2 14 **11509.** **H 1728.** The only measures are:

AB	1902.49	330°.0	7″.89	2*n*	β^6	9.5...12.2
AC	1902.49	192.8	15.93	2*n*	β^6	...11.7

2 14 **11510.** **H 3091.** The only measure is:

1902.51	299°.0	7″.96	2*n*	β^6	10.5...10.6

2 31 **11512.** **β 170.** Discovered with the 6-inch. This star is a distant companion (40°: 160″) to 35 *Aquarii.* There is a faint star between. The wide pair in the field *nf* is H 3092. The other measures show no sensible change.

1877.50	60°.5	1″.68	4*n*	Cin	8.1...8.5
1886.67	59.6	1.75	6*n*	LM	7.8...8.0
1888.73	62.5	1.71	2*n*	T	9.0...9.0
1888.78	60.4	1.56	2*n*	Lv	8.2...8.2
1893.82	58.2	1.17	2*n*	Sellors	8½...8½
1896.72	59.0	1.42	2*n*	Hu	
1897.78	58.6	1.74	3*n*	See	8.2...8.4
1901.65	58.3	1.76	3*n*	Doo	8.1...8.4

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Δ (**I**)....Cin^3....Cin^4....Cin^5....Wilson (Cin^{10})....LM....Lv^1....T (2991)....Sellors (3240)....Hu (*A. J.* 397)....See (3496)...Scott (*Mon. Not.* **LXIV**, 52)...]

11514. **Σ 2873.** (= **S 806.**) *Cephei* 180. B. A. C. 7735. $2^m\ 40^s$
Relatively fixed, but small common proper motion.

A = 0″.146 in 258°.1 Auwers
0.145 in 256.9 } Gr. 10-year 1890
B = 0.128 in 276.3 }

Evidently the proper motion is practically the same for each star.

1851.87	76°.2	13″.79	1*n*	OΣ
1868.10	75.5	13.61	4*n*	Δ
1887.22	74.9	13.36	2*n*	Eng
1904.61	73.6	13.76	1*n*	Hu
1905.81	72.6	13.58	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...Ra (**XXIV**)...OΣ (**IX**)...Δ (1209)...Δ (**I, II**)... Je (2407)...Safford (*Mon. Not.* **XXXIX**, 96)...Engelhardt (**II**)...Lau (4078)... β^6...]

11517. **H 3092.** The following is the only observation since 1830: 2 53

1892.67	342°.8	28″.42	2*n*	Gla	8.9...9.5

[Glasenapp (**II**)...]

11518. **Hu —.** Discovered by Hussey, but not given in his numbered catalogues. 3 :

[Hu (*A. J.* 397)...]

11520. **Ho 470.** Only this later: 3 24

1895.78	356°.8	11″.53	1*n*	Ho

[Ho (3234, 3558)...]

11521. **β 842.** Discovered with the 15½-inch at the Washburn Observatory. The later measures show no change. 3 31

1886.84	118°.7	1″.28	3*n*	UL
1887.77	121.6	1.23	3*n*	Com
1902.24	120.9	1.21	8*n*	Doo

[β (**XII**)....β^4....UL....Com (**VI**)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

11523. **Σ 2868.** Probably fixed. 3 44

1868.13	2°.5	1″.08	3*n*	Δ
1893.66	2.5	1.06	2*n*	Gla
1904.79	357.9	1.01	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Bp...Da^3...Se...Δ (**II**)...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LXVI**, 31)...]

11524. **H 995.** The only observations since are: 3 49

1830+	145°.3	7″ ±	1*n*	H (V)	12 ...12
1904.44	140.2	9.54	2*n*	β^6	10.3...10.3

11525. **See 470.** A later position: 3 49

1898.77	35°.9	1″.72	3*n*	Cg	8.2...9.2

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

3^m 54^s **11526.** π^1 *Pegasi.* The principal star has a proper motion of 0″026 in 235°0 (Auwers). The only other measures are:

AB	1900.68	317°2	27″23	2*n*	β	...13.5
AC	1900.68	262.3	71.70	2*n*	β	...11.0
AD	1900.68	89.3	187.50	2*n*	β	...11.5

[β^1...β^3...β^5...]

4 5 **11527. Σ 2867.** No change.

1865.09	209°1	10″50	3*n*	Δ
1893.68	208.9	10.46	2*n*	Gla
1904.44	209.0	10.59	2*n*	β

The 40-inch shows a 13.5 m star near C, 252°8 : 8″9.

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**V, VII**)...Δ (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^6...]

4 8 **11528. Σ 2870.** (= **H 1732.**) Fixed.

1866.46	271°1	5″37	3*n*	Δ
1894.70	270.8	5.45	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H (**IV**)...Δ (**II**)...Glasenapp (**III**)...]

4 8 **11529. Lv 11.** Discovered by Leavenworth at the McCormick Observatory. No change.

1886.79	164°6	0″93	2*n*	Lv
1899.63	165.3	0.91	3*n*	Hu

[LM...O. Stone (*A. J.* 156)...β (3048)(*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...]

4 10 **11530. H 5526.** Double in *Harvard Zones*, 22″ *nf.* No measures.

4 13 **11531. Σ 2866.** (= **H 1734.**) No change.

1865.72	55°0	9″30	3*n*	Δ
1879.43	52.5	9.48	1*n*	Cin
1901.76	53.4	9.17	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Cin^5...Bowyer (*Mon. Not.* **LXIV**, 805)...β^5...]

4 21 **11533. H 1735.** The declination in H is 1° more, but that is an error; examined and identified as given here (1876). The principal star is 6½ m in Lalande. The components are DM (44°) 4059 and 4060. The only measures are:

AB	1901.68	110°1	27″12	2*n*	β^5	7.2... 8.7
BC	1901.68	164.3	22.74	2*n*	β^5	...11.2

4 26 **11535. H 1737.** Double in O. Arg. N. The only measure is:

1902.18	165°8	6″76	2*n*	β^6	9.0...9.1

4 29 **11537. β 375.** Discovered with the 6-inch. The later measures show no motion.

1891.72	306°9	0″88	2*n*	β	8.5... 9.2
1902.71	307.5	0.81	3*n*	Doo	8.7...10.9

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Δ (**I**)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11538. OΣ 463. Very little, if any, change. 4^m 30^s

1866.55	352°6	4″51	3*n*	Δ
1887.86	353.9	4.47	2*n*	Hl
1898.68	353.9	4.58	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...Big...Hl (**II**)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11540. Σ 2869. *Pegasi* 129. The distance by Struve appears to be too large. The other measures show no change. 4 32

1829.50	253°7	22″74	3*n*	Σ
1867.13	252.7	21.15	5*n*	Δ
1878.40	253.4	21.53	3*n*	β
1893.68	250.2	21.48	2*n*	Gla
1905.58	253.3	21.28	3*n*	β

[Δ (1573)...Δ (**II**)...Flm...β^1...Glasenapp (**III**)...β^6...]

11542. Σ 2872. (AB = **H IV. 126** = **Sh 338.**) There appears to be some angular motion in the close pair. Most observers reverse the angle, and OΣ has suggested variability in the relative brightness of these stars. 4 32

B and C

1834.65	334°9	0″52	5*n*	Σ
1849.11	333.2	0.62	5*n*	OΣ
1870.41	325.0	0.58	4*n*	Δ
1879.73	323.9	0.68	2*n*	Hl
1880.59	326.8	0.59	1*n*	β
1884.69	327.4	0.57	5*n*	En
1885.87	319.1	0.59	2*n*	Hl
1893.87	319.9	0.66	2*n*	Big
1895.85	317.6	0.71	2*n*	Collins
1896.85	325.5	0.62	3*n*	Coleman

No change in the relation of A and BC.

1866.58	316°4	21″56	3*n*	Δ
1882.80	316.0	21.68	4*n*	Hl
1896.47	315.9	21.68	5*n*	Coleman

[Ma (*F. S.* **I**)...Ma (**IX, X**)...H (**IV, V**)...OΣ (**IX**)...Se (*Comp. Rend.* **XLVIII**, 375)...Se...Flm...Bl (**V**)...Δ (1800)...Δ (**II**)...β^1...β^3...Newcomb (*Wash. Obsns.* 1867)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...En (2786)...Big (*Bul. Ast.* **XII**, 299)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**)...]

11543. β 769. Discovered with the 6-inch at Mt. Hamilton in 1879. Probably direct motion in angle. Gould 6.8 m. The other observations are: 4 37

1879.69	348°6	0″6 ±	1*n*	β	7.0...8.0
1897.79	342.4	0.46	1*n*	See	6.1...8.1
1898.76	357.4	0.66	4*n*	A	7.0...7.9

[β (**XI**)...β^2...β (3114)(*Pub. L. O.* **II**)...See (3496)...A (3585)...]

11545. Σ 2874. Unchanged. 4 45

1866.67	150°6	9″40	3*n*	Δ
1905.57	149.9	9.56	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...β^6...]

11546. A. G. 280. Double in *A. G. Leiden.* Measures by β^6 5 2

1904.56	178°4	10″15	3*n*	Espin	9.0...10.0

[Espin (*Mon. Not.* **LXVI**, 144)...]

5^m 9^s **11547.** **H 3094.** The only measure is:

1901.15 301°6 4″97 2*n* β^5 10.7...10.7

A little *p* this, and about 2′*s* is a similar pair, components equal, and about the same magnitudes as the other.

1901.62 294°6 3″72 2*n* β^5 10.5...10.5

One of these is H 3094 and the other probably H 957, as nothing else could be found in the vicinity. In this case the declination of the last is about 20′ too large in H.

5 10 **11548.** **H 957.** See No. 11547.

5 39 **11550.** **H 1740.** "Quadruple; two other small stars *nf* and *sp*."

5 50 **11552.** **H 1742.** "Multiple; 6 or 8 stars near." The other stars are too distant to be of any interest.

1904.59 344°2 22″98 1*n* β^6 8.6...9.5

5 55 **11553.** **β 698.** Discovered with the 18½-inch. Probably unchanged.

1885.73	337°5	10″45	2*n*	HΣ
1891.63	337.9	10.55	2*n*	β
1898.88	337.8	10.33	2*n*	β
1899.80	337.1	10.58		Gr. Obsy.
1899.82	337.7	10.64	5*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LX**, 519)...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

6 4 **11554.** **Ho 289.** The other measures are:

A and B

1895.72	348°0	61″41	1*n*	Ho
1904.59	346.9	60.38	1*n*	β
1905.06	346.8	61.38	3*n*	Doo

B and C

1895.72	326°4	2″40	1*n*	Ho
1904.59	321.9	3.26	1*n*	β
1905.06	326.6	2.56	3*n*	Doo

B and D

1895.72	278°0	15″46	1*n*	Ho
1904.59	275.2	15.65	1*n*	β
1905.06	273.9	15.02	3*n*	Doo

[Ho (2977, 3558)...β^6...]

6 5 **11555.** **Ho 178.** No motion.

1892.71	223°3	2″88	1*n*	Ho
1901.95	222.4	3.70	5*n*	Doo

[Ho (2779, 3234)...]

6 9 **11556.** **OΣ 464.** Probably a little increase in the angle. A distant star measured in WS.

1864.94	53°6	0″64 ±	7*n*	Δ
1883.68	55.9	0.57	2*n*	Per
1894.51	59.2	0.60	3*n*	Big
1898.64	62.3	0.61	4*n*	Hu
1903.72	62.3	0.60	2*n*	Biesbroeck

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...WS...WS^2...Per...Per (2560)...En (2678)...Big (*Bul. Ast.* **XII**, 299)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...Biesbroeck...]

11557. **β 475.** Discovered with the 6-inch. All the other measures are given. 6^m 15^s

1879.75	230°6	....	1*n*	Cin
1882.62	237.3	1″83	2*n*	W
1886.76	236.5	1.62	2*n*	LM
1897.89	229.0	1.46	3*n*	Hu
1902.45	228.5	1.64	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...β (3114)(*Pub. L. O.* **II**)...Cin^6...Wilson (Cin^{10})...LM...Hu (*A. J.* 427)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11558. **H 3097.** The 40-inch shows a new companion to B. 6 15

AB	1904.54	38°0	19″96	3*n*	β^6	9.1...11.7
AC	1904.54	338.0	24.16	2*n*	β^6	...12.8
B*b*	1904.54	345.8	5.40	2*n*	β^6	...13.2

11559. **H 1741.** B. A. C. 7746. The principal star (Groombridge 3882) has some proper motion which does not belong to the companion. 6 29

Bossert	0″151 in 62°5
A. G. Harvard	0.151 in 62.8
Paris	0.181 in 71.6

These are all the measures:

1876.29	316°8	23″22	1*n*	Δ	6.0...11.0
1900.68	309.6	25.04	2*n*	Espin	
1900.68	309.1	25.35	2*n*	β	6.2... 9.7

The Δ and β positions give 0″160 in 76°0 for the motion of A.

[Δ (**I**)...Espin (3717)...β^5...]

11560. **H 3098.** Nothing since Herschel but this: 6 30

1904.54 80°5 27″98 3*n* β^6 9.9...10.7

11562. **β 436.** The small star, B, was noted with the 6-inch, and the third star, C, added by Hough with the 18½-inch. In 1889 he measured the principal star as a close pair, 208°5 : 0″53, on a single night, the new component being 11 m (= Ho 290). I could see no trace of any elongation with the 36-inch in 1890, nor at any subsequent time. 6 43

A and B

1889.96	327°8	19″31	1*n*	Ho
1898.58	328.1	19.68	2*n*	β
1903.58	327.7	19.67	2*n*	β

A and C

1898.58	100°1	19″54	2*n*	β
1903.58	100.2	19.09	2*n*	β

There is a 15½ m star, 177°7 : 23″2 (1903).

[β (**VII**)...β (2103, 3048)(*Pub. L. O.* **II**)...Δ (**I**)...Ho (2978)...β^6...]

$6^m\ 47^s$ **11563.** **β** 1215. Discovered with the 12-inch. No change.

1896.78	91°0	1″54	3*n*	A
1902.76	91.9	1.68	3*n*	Doo

[β (**XVII**)....β (3047)(*Pub. L. O.* **II**)....A (3466)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

6 48 **11564.** **Σ** 2876. (= **S** 805.) Fixed.

1865.54	69°2	12″04	3*n*	Δ
1880.71	68.5	11.98	1*n*	β
1894.66	68.1	11.92	2*n*	Gla
1902.66	68.2	12.10	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Da^1...Δ (**II**)...Glasenapp (**III**)...Cin^5...β^3...*Annais Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

7 11 **11566.** **Ho** 179. Very little change if any. All the other measures are given:

1895.42	260°9	0″45	3*n*	Ho
1900.27	257.1	0.48	2*n*	Bryant
1901.39	258.3	0.52	3*n*	Lewis
1901.89	260.0	0.39	3*n*	Bowyer
1902.74	258.0	0.51	5*n*	Doo

[Ho (2779, 3558)....Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

7 17 **11568.** **OΣ** 465. Apparently fixed.

1867.60	323°7	14″98	4*n*	Δ
1897.82	321.0	14.68	2*n*	Doo
1898.65	322.8	14.79	3*n*	Hu

[OΣ (**IX**)....Δ (**I**)....Hu (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **I**)....]

7 18 **11569.** **Σ** 2879. The measures indicate no sensible change in the angle or distance. In Ma (XI) this is called Σ 2889. The measure by Se, 130°5 : 0″5 (1856.93) 1*n*, belongs to another pair, and probably to β 990 (No. 11500).

1834.96	226°7	0″78	6*n*	Σ
1844.97	228.8	0.85	3*n*	OΣ
1866.68	226.9	0.68	3*n*	Δ
1879.94	229.6	0.87	3*n*	β
1894.61	232.9	0.69	2*n*	Gla
1902.71	230.2	0.75	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**IX, XI**)...Se...Se (*Comp. Rend.* **XLVIII**, 375)...Δ (1195)...Δ (**I, II**)...Big...β^1...β^3...β (*Ast. Reg.* **XVIII**, 286)...OΣ (**IX**)...Glasenapp (**II, III**)...]

7 23 **11571.** **Σ** 2875 *rej.* Nothing since Struve but this:

1901.68	44°8	14″81	2*n*	β^5	8.8...11.6

7 30 **11573.** **H** 958. The declination in H is 10′ too small. Double in *A. G. Berlin.*

1902.90	231°2	4″96	3*n*	Miller (A. J. 546)

7 40 **11575.** **Ho** 471. Nothing later but the following:

AB	1904.65	317°4	8″53	1*n*	β	8.0...13.0
AC	1904.65	49.9	15.44	1*n*	β	...13.0

[Ho (3234)...β^6...]

11576. 41 *Aquarii.* **Sh** 339. (= **Ħ** **N.** 56.) Apparently fixed. The proper motion of 41 *Aquarii* is 0″071 in 342°9 (Auwers). $7^m\ 40^s$

1878.00	116°5	5″05	7*n*	Cin	6.3...8.0
1883.01	117.4	5.25	3*n*	Wilson	5.8...7.2
1886.73	115.7	5.01	3*n*	Hl	
1890.56	116.0	4.61	2*n*	Gla	5.2...6.9
1903.75	115.3	4.92	5*n*	Jouffray	

[J^1....P^1....Ra (**XXI**)....Hd....Cin^3....Cin^4....Cin^6....Wilson (Cin^{10})....Hl (*Wash. Obsns.* 1886)...Hl (**II**)...Glasenapp (**I**)...Scott (*Brit. Ast. Ass'n.* **V**, 75; **VI**, 250)...See (3496)...Solá (3497).. Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

11578. **Σ** 2880. (= **OΣ** 466 *rej.*) Fixed. 7 45

1869.54	353°5	4″19	5*n*	Δ
1899.60	353.0	4.39	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H (**IV**)...OΣ (**IX**)...Δ (**II**)...Glasenapp (**IV**)...Hu (*Pub. L. O.* **V**)...]

11579. **β** 699. Discovered with the 18½-inch. No motion. All the later measures are given: 7 45

1891.72	185°1	2″43	3*n*	β
1896.80	186.3	(0.96)	1*n*	Lewis
1899.54	184.5	2.46	3*n*	A
1900.28	184.3	2.24	3*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400)...A (3639)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11580. **β** 171. Discovered with the 6-inch. This is a distant companion to 41 *Aquarii.* No change. 7 51

1892.70	259°8	11″66	2*n*	Wilson	8.8...12.2
1898.50	256.0	11.58	2*n*	Doo	8.5...10.2
1898.65	258.1	11.49	3*n*	Cg	8.0...11.2

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...Cin^4...Cin^5...Cin^6...Wilson ( )...Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11582. **Σ** 2883. (= **Ħ** **N.** 121 = **Sh** 340.) No motion. 7 55

1865.54	254°7	14″59	3*n*	Δ
1902.71	253.7	14.76	3*n*	Hu
1903.59	253.8	14.62	4*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Ra (**XXIV**)...H (**V**)...Δ (1209)...Δ (**I, II**)...Do (3023, 3799)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Lau (4078)...β^6...]

(See p. 1085)

11583. **O. Stone** 57. Approximate place. The other measures are: 8 :

1879.75	95°7	9″41	1*n*	Cin	8.0...12.0
1891.76	95.8	10.04	2*n*	Collins	8.5...10.0

[Cin^5...Cin^6...Collins (*Proc. Haverford Coll. Obsy.* 1891)...]

11584. **β** 376. Discovered with the 6-inch. The later measures show no motion. 8 1

1885.54	148°2	3″61	2*n*	HΣ
1892.75	150.7	3.68	3*n*	Wilson
1903.04	149.8	3.69	6*n*	Doo

[β (**VI**)....β (2062)....Δ (**I**)....Wilson( )....HΣ (**XII**)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

8^{m} 3^{s} **11586.** **H** I. 49. (= σ 745.) There is a 6–7m star in the place given in H, but no double of Class I. All the stars near examined (1876). The vicinity thoroughly searched with the 40-inch in 1901. There must be a large error in Herschel's place.

[β5...]

8 10 **11588.** **Ho 291.** The later measures are:

1896.79	197°.9	8″.66	2*n*	Ho
1904.67	198.3	9.44	3*n*	Doo

Ho (2977, 3558)...]

8 31 **11590.** **Σ 2878.** Possibly a little diminution in the angle, with no change in distance.

1830.31	130°.8	1″.36	4*n*	Σ
1865.83	128.8	1.31	2*n*	Δ
1876.90	125.6	1.20	3*n*	Sp
1884.83	129.9	1.66	5*n*	En
1886.58	127.6	1.49	4*n*	Per
1887.86	129.1	1.29	2*n*	Hl
1891.72	126.0	1.36	2*n*	β
1902.66	126.4	1.50	2*n*	Hu

[Ma (*F. S.* I)...Ma (**X**, **XIII**, **XV**)...H2...H (**IV**)...Wr...Da3...Se...Se3... OΣ (**IX**)...Δ (1125, 1195)...Δ (**I**, **II**)...Flm...Harkness (*Wash. Obsns.* 1867) ...WS...WS2...Gl...Sk2...Per...Sp (2133)...Sp (**II**)...Do (3023, 3466, 3681) (*Trans. R. I. Acad.* **XXIX**, Part 13)...En (2742)...T (2895)...Lv1...Ferr... Hl (**II**)...Maw (**I**, **III**)...β (3114)(*Pub. L. O.* **II**)...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXII**, 383; **LXIV**, 805)....*A. G. Leipzig*, p. 251....*Annals Toulouse Obsy.* **III**...]

8 31 **11591.** **Σ 2884.** Without change.

1866.95	151°.7	2″.14	3*n*	Δ
1880.58	148.9	2.10	2*n*	β
1902.69	148.5	2.17	2*n*	Hu
1905.94	149.6	1.94	2*n*	β

There is a pair of small stars in the field:

1905.78 322°.6 6″.66 1*n* β 9.8...10.8

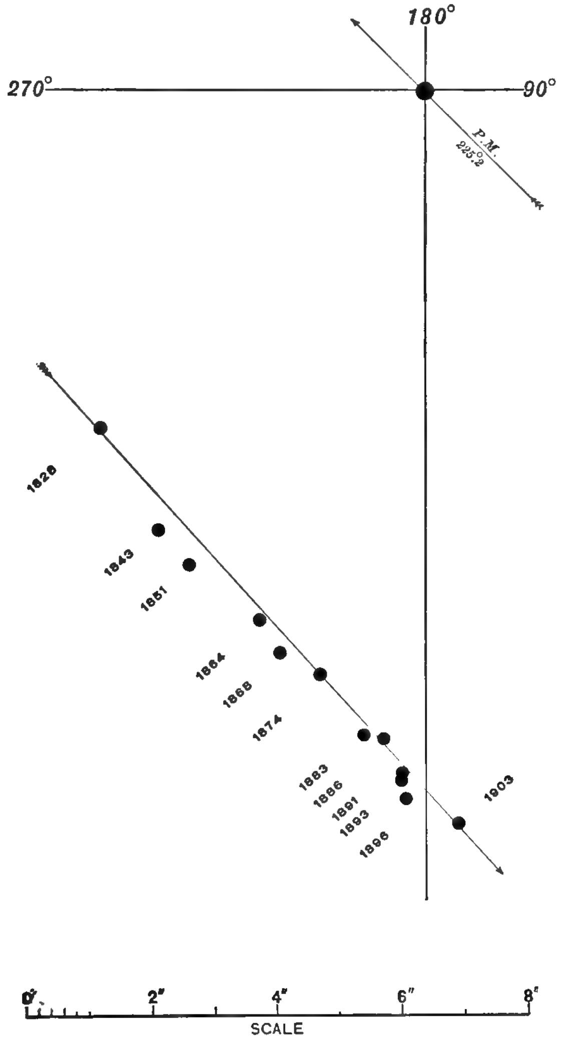
[Ma (*F. S.* I)...Ma (**XI**, **XIII**)...H (**IV**)...Δ (**II**)...β3...β6...]

8 33 **11592.** **Σ 2877.** (= **H** 292.) Change from proper motion of A. This is given:

Stumpe	0″.166 in 230°.9
A. G. Berlin	0.157 in 236.4
Bossert	0.142 in 225.2
Measures of B	0.116 in 222.6

The last is the most probable value from the measures of Σ, OΣ, Δ, Per, and β. The meridian values appear to be too large.

1828.95	316°.4	7″.63	4*n*	Σ
1843.64	328.9	8.36	1*n*	Ma
1851.90	333.7	8.62	2*n*	OΣ
1864.27	342.7	9.02	7*n*	Δ
1868.53	345.5	9.44	4*n*	Du
1874.71	349.8	9.62	3*n*	Δ
1883.70	354.5	10.51	4*n*	Per
1886.79	356°.3	10″.57	2*n*	HΣ
1891.40	357.9	11.06	3*n*	HΣ
1893.66	357.9	11.18	2*n*	Gla
1896.70	358.2	11.49	3*n*	Coleman
1903.58	2.4	11.92	5*n*	β



Σ 2877.

[Ma (*F. S.* I)...Ma (**XI**, **XIII**, **XV**)...H (**VII**)...Mh...Se...Se2...Hd...Ra (**XXVIII**, **XXIX**, **XXXII**, **XXXIII**, **XXXVI**)....OΣ (**IX**, **X**)....Δ (1475, 2193)....Δ (**II**).... Du...Flm...WS...Gl...Sk...Sk2...Do (2199)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Per...Per (2559, 2749)...En (2678)...β1...Maw (**II**)...Glasenapp (**III**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**, **LIV**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β6...]

11593. **β 476.** Discovered with the 6-inch. β 477 is in a low-power field. No change. 8^{m} 41^{s}

1882.68	90°.5	2″.27	1*n*	Perry
1893.54	92.5	2.57	4*n*	Lv
1894.63	93.4	2.52	2*n*	Wilson
1900.46	92.5	2.63	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (**I**)...Perry (*Eng. Mech.* **XXXVI**, 65) ...Lv (*A. J.* 382)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

8^{m} 43^{s} **11595.** **H 1746.** B. A. C. 7765. This is No. 260 of Schjellerup's *Catalogue of Red Stars.* It has a proper motion of 0″029 in 63°1 (Kustner). There are two faint stars *p* A, about the same distance as B.

A and B

1879.52	178°8	27″18	1*n*	Cin	6.0...11.0
1900.66	181.1	27.80	2*n*	Es	6.0...11.0
1904.53	182.1	27.86	3*n*	β	6.5...11.1

A and C

1904.55	188°4	69″78	1*n*	β

[Cin^5...Espin (3717)...β^6...]

8 51 **11596.** **Hd 170.** Near Σ 2877. The only other measure is:

1903.62	242°2	7″38	2*n*	β^6	9.7...9.9

The apparent change in distance is not likely to be real.

9 1 **11597.** **β 991.** Discovered with the 18½-inch. There does not appear to be any material change. The proper motion in *A. G. Harvard* is 0″022 in 270°. The following are all the other measures:

1893.55	143°4	0″57	2*n*	Lv	8.0...8.2
1893.66	145.2	0.73	2*n*	W	8.8...8.8
1899.58	146.3	0.64	4*n*	A	
1900.82	146.3	0.52	2*n*	A	7.3...8.3
1900.96	146.5	0.65	2*n*	Doo	

[β (**XIII**)...β^3...Lv (*A. J.* 382)...Wilson (   )...Com (**X**)...A (3639)(*Bul. L. O.* No. 11)...Doolittle (*Pub. Flower Obsy.* **II**)...]

9 2 **11598.** **Σ 2882.** No motion. Some of the observers reverse the position-angle.

1865.67	326°8	3″34	3*n*	Δ
1894.63	327.3	3.50	4*n*	Gla
1902.70	327.7	3.48	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^5...Glasenapp (**III**)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 805; **LXVI**, 31)...Coleman (*Mem. R. A. S.* **LIV**)...]

9 6 **11599.** **Σ 2881.** (= **S 807.**) Slow retrograde motion in angle, without change in distance.

1830.46	111°4	1″76	3*n*	Σ
1843.45	109.8	1.86	3*n*	OΣ
1867.91	104.4	1.54	5*n*	Δ
1879.73	103.3	1.60	2*n*	Hl
1883.70	101.5	1.50	4*n*	Per
1885.71	102.6	1.62	3*n*	Hl
1890.51	99.9	1.62	3*n*	β
1902.68	99.9	1.68	2*n*	Hu
1903.78	98.5	1.52	6*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X, XI**)...H^1...H (**IV**)...Da^1...Se...Δ (1195, 2195)...Δ (**I, II**)...OΣ (**IX**)...Flm...Du...Big...WS...WS^2...Gl...Do (3023, 3681)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Per...Per (2559, 2749)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Sp (**II**)...β (3048)(*Pub. L. O.* **II**)...Maw (**I, III**)...Glasenapp (**III**)....Collins (*A. J.* 378)....HΣ (**XII**)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806, **LXVI**, 31)...]

9 8 **11600.** **OΣ (App) 230.** No sensible change.

1887.02	159°4	45″46	4*n*	Franz
1903.59	160.0	45.52	3*n*	β

[Δ (**I**)...Franz (3080)...β^6...]

9^{m} 9^{s} **11601.** **A. G. 281.** Double in *A. G. Berlin.*

1904.58	21°1	2″47	2*n*	Bowyer	8.8...9.8

[Cogshall (*A. J.* 546)...Bowyer (*Mon. Not.* **LXVI**, 31)...]

9 10 **11602.** **OΣ 467** *rej.* (= **H 959** = **Ho 613.**) Rejected in second edition of the *Poulkowa Catalogue.* Apparently fixed.

1865.94	273°8	22″83	3*n*	Δ
1894.83	275.7	22.78	2*n*	Ho
1898.68	273.6	23.27	3*n*	Hu
1904.75	274.2	23.35	3*n*	Doo

[Ma (**XI**)...Δ (**I**)...Glasenapp (**IV**)...Ho (3558)...Hu (*Pub. L O.* **V**)...]

9 15 **11603.** **Ho 472.** Nothing later but the following:

1900.63	244°0	4″39	3*n*	Doo	8.3...11.5

[Ho (3234)...Doolittle (*Pub. Flower Obsy.* **I**)...]

9 27 **11604.** **Hu 777.** With two other measures (*Bul. L. O.* No. 65) the mean is:

1904.56	212°6	0″45	3*n*	Hu	8.8...10.2

9 48 **11606.** **H 5322.** (= **H̥ N. 102.**) Error of about 90° in the angle of H. H̥ give 300° ±. The only later observations are:

1879.74	294°6	12″89	1*n*	Cin^6	9.5...9.5
1903.59	294.7	13.32	3*n*	β^6	9.6...9.6

9 56 **11608.** **Σ 2885** *rej.* The only other measures are:

1902.70	99°8	21″95	2*n*	Hu	
1904.57	99.1	21.67	3*n*	β	8.6...10.3

[H (**IV**)...Cin^6...β^6...]

9 58 **11609.** **Σ 2886.** Fixed.

1865.80	109°5	19″35	3*n*	Δ
1900.71	108.6	19.82	4*n*	Do
1902.70	108.4	19.94	2*n*	Hu
1905.85	108.7	19.71	2*n*	β

[H (**IV**)...Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...Do (3681)...β^6...]

10 24 **11612.** **Ho 614.** The principal star has a proper motion of 0″045 in 180° (*A. G. Harvard*).

1902.71	174°2	4″76	3*n*	Doo

[Ho (3558)...]

10 26 **11613.** **Σ 2890.** Fixed.

1865.88	12°2	9″15	3*n*	Δ
1905.85	11.4	9.29	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Cin^5...Do (3681)...β^6...]

10 28 **11614.** **β 477.** Discovered with the 6-inch. Relatively fixed.

1882.68	46°0	7′04	1*n*	Perry
1893.54	43.5	6.48	3*n*	Lv
1894.63	43.4	6.48	2*n*	Wilson
1899.12	43.6	6.64	4*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (**I**)...Perry (*Eng. Mech.* **XXXVI**, 65) ...Lv (*A. J.* 382)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

10m 42s **11617.** **Σ 2893.** (= **H IV. 82.**) Without change.

1877.26	348°1	28′91	18*n*	Δ
1877.73	348.2	28.96	7*n*	Hl
1900.73	347.6	28.93	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...H¹...H (**IV, V**)...Ra (**XXIV**)...Δ (**I**, pp. 102, 411)....Δ (**II**)....OΣ (**X**)....Je (2407)....Cin⁵....En (2662)....Hl (*Wash. Obsns.* 1876)...Hl (**I**, p. 23)...Glasenapp (**II, III**)...Lau (4078)...]

10 46 **11618.** **Σ 2889.** No change.

1869.53	196°0	2′42	4*n*	Δ
1893.69	197.7	2.59	2*n*	Gla
1902.72	196.8	2.29	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LXVI**, 31)...]

10 46 **11619.** **H 5324.** "R. A. somewhat uncertain." Examined and place found to be substantially correct. Larger star about 9m (1873). Recently identified and measured:

1902.58	357°8	11′09	2*n*	β⁶	8.6...9.5

10 49 **11620.** **Ho 180.** So far there is no motion.

1895.39	230°2	0′45	3*n*	Ho
1900.58	225.7	0.65	2*n*	A
1900.71	226.2	0.62	2*n*	Do
1901.44	223.4	0.53	2*n*	Bryant
1902.19	224.2	0.56	3*n*	Lewis
1902.73	227.6	0.68	4*n*	Doo

[Ho (2779, 3558)....Greenwich Obsy. (*Mon. Not.* **LX**, 514; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Do (3681)...A (*Bul. L. O.* No. 11)...Doolittle (*A. J.* 547)...]

10 54 **11621.** **OΣ 468.** No evidence of change.

1898.67	163°5	12′81	4*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**, p. 230)...Hu (*Pub. L. O.* **V**)...]

11 2 **11623.** **H 293.** (= **Σ 2888** *rej.*) "Small star *bluish.*" Measures from H (IV).

1901.25	276°3	18′55	3*n*	β⁵	8.7...11.0

11 10 **11624.** **Σ 2887.** Probably without change.

1867.08	28°2	8′57	3*n*	Δ
1892.68	28.2	8.15	2*n*	Gla
1902.66	29.4	8.61	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)..H (**V**)...Mh...Δ (**II**)...Se...Cin⁵...Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...]

11625. **β 377.** Distant double companion noted with the 6-inch. The large star has a proper motion of 0′226 in the direction of 81°4 (*A. G. Harvard*). The measures of AB give for this movement 0′256 in about 62°. The 36-inch shows six or eight stars nearer to A than B, including a faint pair, with distance less than BC, 16′5 from A in the direction of 263°. 11m 23s

B and C

1891.54	302°8	7′02	3*n*	β
1898.58	303.6	6.80	2*n*	β
1899.79	303.5	7.07		Gr. Obsy.
1905.90	300.5	6.71	2*n*	β

A and B

1891.54	65°9	63′88	3*n*	β
1898.58	65.8	62.30	2*n*	β
1899.79	66.1	61.81		Gr. Obsy.
1905.90	65.6	60.13	2*n*	β

The measures from the Greenwich Observatory are from photographs. Some of the small stars above referred to are also given:

A*a*	1899.79	112°6	33′54	...13.0
A*b*	1899.79	264.2	34.88	...13.0
A*c*	1899.79	260.9	40.09	...14.0
bc	1899.79	241.5	6.07	

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Greenwich Obsy. (*Mon. Not.* **LX**, 519)... β⁶...]

11626. **Σ 2891.** Fixed. 11 37

1865.86	309°2	12′63	3*n*	Δ
1905.85	309.4	12.84	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Do (3681)...β⁶...]

11628. **See 471.** Other measures are: 11 53

1899.33	34°4	4′80	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

11629. **A 184.** No other measures. 12 14

[A (3741)(*Bul. L. O.* No. 3)...]

11632. **H 961.** (= **Ho 473.**) This is the only measure: 12 25

1893.79	287°8	16′70	1*n*	Ho	8.0...11.5

[Ho (3234)...] (See p. 1085)

11633. **H 3104.** Nothing later but this: 12 35

1901.78	75°5	10′27	2*n*	β⁵	9.3...9.5

11635. **Kr 57.** Noted as "duplex" in *A. G. Hels.* 12 48

1899.26	224°5	1′64	5*n*	Doo	8.8...8.8

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11636. **β 378.** B was discovered with the 6-inch, and C added with the 18½-inch. All the later measures are given: 12 50

A and B

1878.65	90°4	3′33	1*n*	β	8.2... 8.5
1892.75	90.9	3.39	3*n*	Wilson	8.5... 9.3
1898.70	88.3	3.44	2*n*	Doo	8.7... 9.5

A and C

1892.74	31°6	7″06	2*n*	Wilson	...12.5
1898.70	29.0	7.42	2*n*	Doo	...10.5

[β (**VI**)...β (2062)...β1...Δ (**I**)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...]

12^m 55^s **11637.** **Σ 2892** *rej.* Measures from *Mensurae Micrometricae*, p. xxxiv. C is SD (11°) 5806. The complete measures are of recent date.

A and D

1879.75	58°1	9″ ±	1*n*	Cin	
1901.78	57.5	11.69	2*n*	β	8.4...11.1
1902.70	55.8	11.84	2*n*	Hu	...12.0

A and C

1879.75	263°7	36″29	1*n*	Cin	
1901.78	262.8	35.97	2*n*	β	... 9.2
1902.70	263.4	36.18	2*n*	Hu	

[H (**V**)...Cin^6...β^5...]

13 28 **11640.** **Ho 181.** The later measures are:

A and B

1893.73	37°4	2″49	1*n*	Ho	8.2...10.5
1905.75	38.1	2.95	3*n*	Doo	8.7...10.4

A and C

1893.73	298°3	18″06	1*n*	Ho	...10.5
1905.75	298.8	18.40	3*n*	Doo	...10.1

A and D

1893.73	350°8	28″22	1*n*	Ho	...10
1905.75	350.6	28.57	3*n*	Doo	... 9.5

[Ho (2779, 3558)...]

13 40 **11641,** **Σ 2894.** (= **H** **III.** 17 = **Sh** 341.) Fixed. Called 1 *Lacertae* in Sh.

1868.71	193°0	15″48	5*n*	Δ
1880.75	193.7	15.43	2*n*	β
1898.37	193.4	15.51	4*n*	Coleman
1905.85	193.5	15.38	2*n*	β

There is a 13m star, 246°2 : 42″6 (1905).

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Ra (**XXII**)...Bl (**V**)...Δ (1209)...Δ (**I, II**)...Du...WS...Gl...Per...Per (2560)...β^3...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...β^6...]

13 59 **11643.** **H 1749.** Nothing but this since 1828:

AB	1905.51	264°5	16″58	1*n*	β^6	9.7...12.0
AC	1905.51	44.2	17.72	1*n*	β^6	...13.0

14 : **11644.** **Howe 61.** From Cin^5. This should be 8′ *s* of the triple, 30 *Pegasi*, but there is no star in that place in the DM, and nothing found in a recent search in or anywhere near the given place. All the neighboring stars were examined. It is undoubtedly identical with β 842 (No. 11521), which is about 10^m *p* and 3′ *n* of the place given above. The description corresponds exactly.

[β^5...]

11645. **H 1750.** The only measure is: 14^m 4^s

1905.47	247°8	22″43	1*n*	β^6	8.8...11.5

11646. 30 *Pegasi.* **H 962.** "The most difficult imaginable." Measures from H (IV). The proper motion is small, 0″016 in 251°5 (Auwers). This does not agree with the apparent change in the distance of C. 14 25

A and B

1867.08	19°8	6″18	3*n*	Δ	5.7...11.0
1876.77	18.9	6.32	3*n*	Hl	
1881.64	20.7	6.27	3*n*	β	...12.0
1885.74	19.9	6.31	1*n*	HΣ	
1886.66	20.3	6.24	7*n*	Hl	
1903.60	19.1	5.87	3*n*	β	...12.1

A and C

1876.77	221°1	9″94	3*n*	Hl	
1881.64	222.8	10.08	3*n*	β	...12.3
1885.82	221.6	10.21	1*n*	HΣ	
1886.66	221.5	10.67	7*n*	Hl	
1903.60	223.1	11.59	3*n*	β	...11.8

The five sets of measures of C give for the most probable proper motion of A, 0″065 in 142°1, and B appears to have the same movement.

[H (**V**)...Δ (**I**)...Flm...β1...β4...Cin^6...Pt...Hl (*Wash. Obsns.* 1885-6)...Hl (**I, II**)...Big (*Bul. Ast.* **XII**, 299)...HΣ (**XII**)...β^6...]

11648. From H (V); observed by him for Σ 2898. "*Orange : blue.*" 14 25

1901.60	305°2	39″95	2*n*	β^5	8.0...11.0

11649. **Σ 2896.** No change since 1833. 14 36

1865.61	241°9	21″32	3*n*	Δ
1902.69	241.5	21.38	2*n*	Hu
1902.87	241.8	20.95	2*n*	Es

[H (**IV**)...Ma (*F. S.* **II**)...Δ (**II**)...Espin (*Mon. Not.* **LXIV**, 677)...]

11650. **β 1216.** Discovered with the 16-inch of the Warner Observatory in 1885. Probably unchanged. 14 42

1890.51	317°7	0″64	3*n*	β
1892.76	317.0	0.50 ±	6*n*	Sp
1896.90	315.7	0.57	4*n*	A
1897.17	313.4	0.49	9*n*	Lewis
1897.69	310.9	0.54	2*n*	Bowyer
1901.79	319.2	0.57	3*n*	Doo
1901.91	310.8	0.56	4*n*	Bowyer

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Sp (**III**)...A (3466)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 514; **LXI**, 486; **LXIII**, 403)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11652. **A 782.** With other measures (*Bul. L. O.* No. 61) the mean is: 14 48

1904.56	260°2	0″35	3*n*	A	9.1...9.7

11653. **See 472.** Near Cord. G. C. 30519. 14 50

1899.14	57°4	5″59	2*n*	Boothroyd

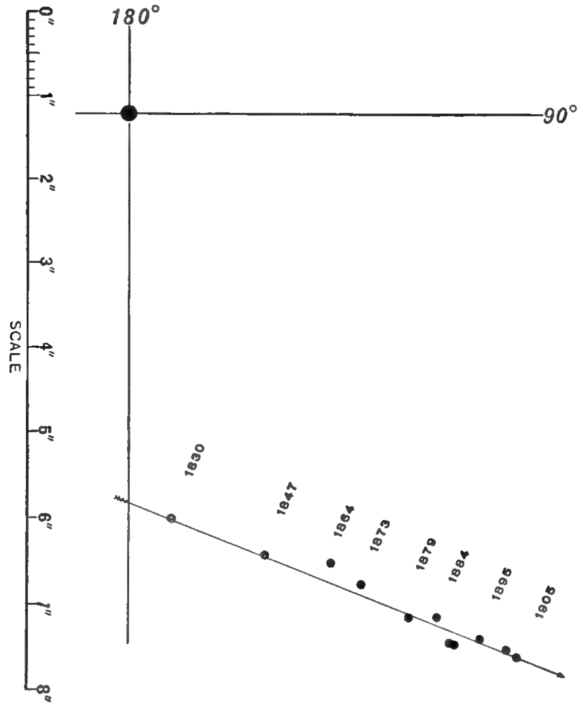
[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...]

15^m 0^s **11656.** **H** 1752. The only measure is:

1905.45	294°.4	16″.39	1*n*	β^6	9.8...10.3

15 8 **11657.** **Σ** 2895. Change from proper motion. From the measures A appears to have a proper motion of 0″.057 in 247°.8.

1830.09	6°.1	4″.85	3*n*	Σ
1847.80	17.1	5.49	7*n*	Ma
1864.33	24.1	5.87	8*n*	Δ
1873.70	26.0	6.23	2*n*	Δ
1879.73	28.9	6.83	2*n*	Hl
1884.85	31.2	7.00	2*n*	Hl
1889.77	31.0	7.34	2*n*	HΣ
1893.66	31.2	7.38	2*n*	Gla
1895.77	33.4	7.50	3*n*	Collins
1902.96	34.9	7.78	2*n*	Do
1905.51	35.1	7.91	3*n*	β



Σ 2895.

There is a pair of small stars in the field, from Σ 2895, 142°.1 : 121″.09 (1905.56):

1905.56	78°.9	11″.98	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H (**IV, V**)...Hd...Flm...Δ (1475)...Δ (**II**) ...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 3931)...WS...Gl... Sk...Sk³...Du...Hl (*Wash. Obsns.* 1884)...Hl (**I, II**)...En (2678)...Jones (*A. J.* 312)...Glasenapp (**III**)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...β^6...]

15 9 **11658.** **A** 185. No other measures.

[A (3741) (*Bul. L. O.* No. 3)...]

15 11 **11659.** **OΣ** 469. The distance is very slowly decreasing. One of the components must have a small proper motion. All the measures are given:

1843.65	280°.4	32″.21	1*n*	Ma
1846.79	280.5	31.80	3*n*	OΣ
1851.76	281.6	31.98	1*n*	Ma
1869.70	281.6	30.96	4*n*	Δ
1875.73	282.3	30.97	2*n*	OΣ
1880.18	282.6	30.78	2*n*	β
1884.05	282.6	30.64	5*n*	En
1886.61	282.9	30.74	2*n*	Per
1887.80	283.1	30.49	3*n*	HΣ
1898.62	283.7	30.36	3*n*	Hu
1898.95	283.2	30.23	2*n*	Coleman
1901.67	284.2	30.35	3*n*	Doo

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...β³...En (2742)...Per...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...Coleman (*Mem. R. A. S.* **LIV**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11662. **H** 1753. The only measures are: 15^m 25^s

AB	1903.52	184°.6	4″.97	2*n*	β^6	9.6...9.6
AC	1903.57	174.8	38.48	1*n*	β^6	...9.5

11663. γ *Aquarii.* **H** 3106. Change from the proper motion of A: 15 27

Auwers	0″.102 in 85°.0
A. G. Nico.	0.103 in 80.5

The only measures since Lamont's in 1838 are:

1878.72	129°.6	43″.87	1*n*	β	
1901.59	132.0	42.16	2*n*	β	...12.2

The three measures give 0″.142 in 95°.7 for the proper motion of A.

[Mu...Pk...β1...β5...]

11664. **β** 1217. Discovered with the 36-inch. A difficult pair, and therefore the change in angle requires verification. The magnitude in DM is 7.0. 15 33

1892.93	225°.9	0″.55±	5*n*	Sp
1896.78	224.8	0.59	2*n*	A

[β (**XVII**)...β (3047) (*Pub. L. O.* **II**)...Sp (**III**)...A (3466)...]

11665. **A** 186. No other measures. 15 38

[A (3741) (*Bul. L. O.* No. 3)...]

11666. 32 *Pegasi.* **Ho** 615. Later positions are: 15 47

AB	1905.78	126°.9	72″.63	2*n*	β
BC	1901.75	17.1	2.27	2*n*	Doo
	1905.93	19.7	2.74	1*n*	β
AD	1905.78	307.1	42.86	1*n*	β

[Ho (3558)...β^6...]

11667. **Σ** 2897. (= **H** 294.) Fixed. 15 58

1867.63	99°.8	16″.78	4*n*	Δ
1893.68	98.2	17.40	2*n*	Gla
1902.68	98.9	16.95	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Glasenapp (**III**)...*Anna's Toulouse Obsy.* **III**...]

$16^{m}\ 0^{s}$ **11668.** **β 379.** Discovered with the 6-inch. Without change.

1882.68	336°0	1″08	1*n*	Perry
1891.65	333.7	1.02	3*n*	β
1902.85	332.9	1.19	7*n*	Doo

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Δ (**I**)...Perry (*Eng. Mech.* **XXXVI**, 65) ...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

16 4 **11669.** 2 *Lacertae*. **H 1755.** No motion. These are all the measures of the Herschel companion:

1879.47	9°7	48″20	2*n*	β^3	...10.9
1903.62	9.5	48.02	3*n*	β^6	...10.8

The principal star was found to be a spectroscopic binary by Frost and Adams at the Yerkes Observatory (*Astrophysical Jour.* XVIII, 387).

16 22 **11671.** **Σ 2898.** No change.

1865.64	282°3	12″25	3*n*	Δ
1893.69	281.3	12.56	2*n*	Gla
1902.56	281.1	12.68	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Glasenapp (**III**)...*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...]

16 26 **11672.** **Kr 58.** Noted "duplex" in *A. G. Hels.*

1899.15	28°4	1″98	5*n*	Doo	9.2...9.5

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

16 33 **11673.** **Σ 2899** *rej.* Measures from β^6

16 37 **11674.** **OΣ (App) 231.** The only other position is:

1901.67	110°2	90″85	2*n*	β

[Δ (**I**)...β^5...]

16 39 **11676.** **H 3111.** "Difficult; verified with 320." The companion is much fainter than most of Herschel's small stars.

1905.43	84°9	10″22	1*n*	β^6	9.0...15.5

16 42 **11677.** **H 1756.** There is an error in Herschel's magnitude of A. In DM it is 6.5. The 40-inch shows a new companion about the same distance from A:

AB	1901.73	286°5	22″08	2*n*	β^5	6.7...10.6
AC	1901.73	325.8	22.43	2*n*	β^5	...13.2

17 3 **11680.** **Ho 474.** Only the following later:

AB	1904.61	112°1	43″67	1*n*	β
BC	1904.61	37.1	3.88	1*n*	β
CD	1904.61	254.5	11.60	1*n*	β

[Ho (3234)...β^6...]

17 13 **11682.** **Ho 292.** No other measures.

[Ho (2977)...]

11683. **H 1761.** "Almost sure of its being double, but had not time to apply a higher power." The pair measured here has substantially the same place, and is doubtless the one referred to. There is nothing else near. $1\text{-}^{m}\ 1|^{s}$

1905.43	35°3	4″66	1*n*	β	10.3...10.6

[β (*Mon. Not.* **XXXIV**, 381)...β^6...]

11685. **OΣ 470.** Probably fixed. 17 26

1868.92	357°6	3″82	5*n*	Δ
1879.56	357.3	3.73	1*n*	β
1889.75	358.4	3.88	2*n*	Hl
1898.59	356.5	4.08	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Sk^2...Big... β^3...Hl (**II**)...Hu (*Pub. L. O.* **V**)...Sk^5...]

11686. **OΣ (App) 232.** (= **H 3108.**) H found the stars equal, and the angle 10°4. The recent measures show change in distance. 17 34

1901.81	190°9	67″58	2*n*	β	8.4...8.4

[⅃ (**I**)...β^5...]

11687. **Ho 182.** Later measures give: 17 37

1894.76	131°5	1″31	2*n*	Ho
1902.72	130.4	1.77	3*n*	Doo

[Ho (2779, 3558)...]

11690. 33 *Pegasi*. **Σ 2900.** (AC = **H̥ V. 99** = **Sh 342** = **OΣ (App) 233.**) The change in the Struve companion is only in the distance. These stars have a large common proper motion, and probably make a physical system. The relative change will be seen from the following positions: 17 5

A and B

1832.38	180°7	2″47	6*n*	Σ
1852.65	181.4	2.45	2*n*	Ma
1857.21	178.7	2.57	7*n*	OΣ
1863.71	177.7	2.31	5*n*	Δ
1884.51	179.5	1.91	5*n*	Per
1888.43	177.7	1.93	3*n*	HΣ
1888.84	177.8	1.68	3*n*	Hl
1891.79	178.6	1.83	3*n*	Lv
1901.08	174.9	1.33	7*n*	Bowyer
1902.72	178.1	1.60	2*n*	Hu
1904.13	180.4	1.47	3*n*	Lewis

The companion has an annual motion of 0″017 in the direction of the principal star.

The proper motion of 33 *Pegasi* is:

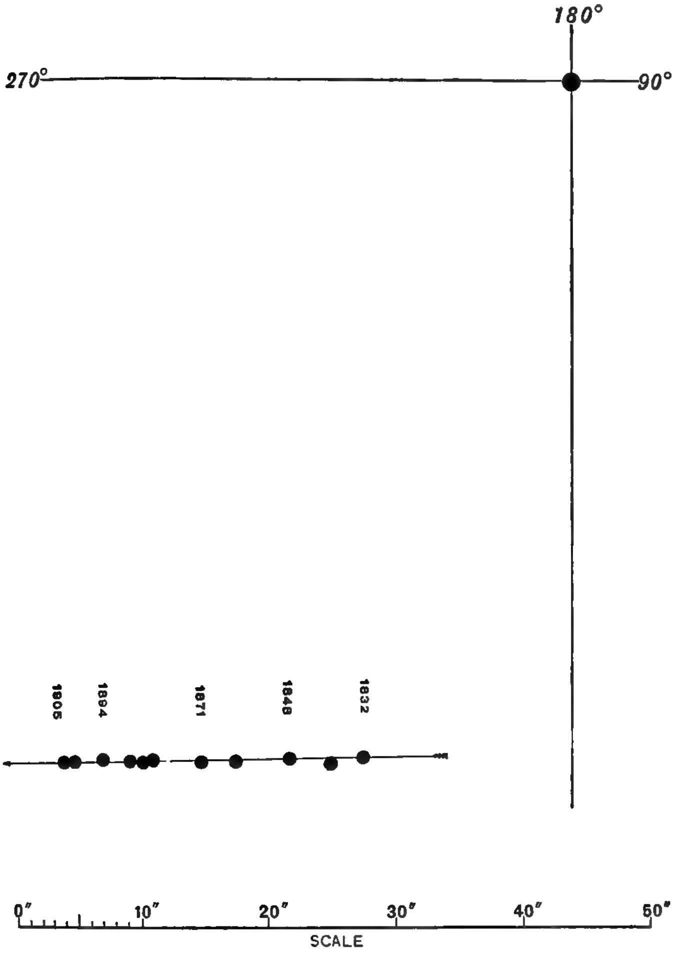
Auwers	0″317 in 93°4
Measures of C	0.324 in 90.9

The last value is from the following measures of the distant star:

A and C

1832.70	343°0	56″56	6*n*	Σ
1839.88	340.7	57.79	2*n*	OΣ
1848.44	337.6	58.60	3*n*	OΣ
1863.71	334.0	60.53	5*n*	Δ

1871.76	331°7	61″90	3*n*	OΣ
1884.04	328.6	63.60	2*n*	En
1886.71	328.2	63.97	2*n*	Eng
1888.84	327.3	64.57	3*n*	Hl
1894.77	325.8	65.66	1*n*	Big
1902.72	324.2	67.14	2*n*	Hu
1905.46	323.6	67.65	3*n*	β



33 Pegasi. Σ 2900. AC.

[Σ1....Ma (**X, XI, XIII, XV**)....Ma (*F. S.* **I**)....H (**VII**)....Bp....Da1....Da2....Da3...P1...Mh...Wr...Ba (**II, III, IV**)...OΣ (**IX, X**)...Δ (1475)...Δ (**II**)...Flm...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 3466, 3681)...WS...WS2...Gl...Sk...Per...Per (2560, 2749)...En (2678)...Lv (*Proc. Haverford Coll. Obsy.* 1891)....Engelhardt (**II**)....Rechenberg (3482)....Hl (**II**)....Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)...Franz (3464)...HΣ (**XII**)...Sk5....*Annals Toulouse Obsy.* **III**....Lewis (*Observatory*, **XXV**, 402)....Scott (*Mon. Not.* **LXIV**, 52)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 515; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806; **LXVI**, 32)...β6...]

17m 52s **11691.** 51 *Aquarii.* **β 172.** (AC = H V. 95 = σ 748.) Discovered with the 6-inch. It conclusively appears from the measures that it is a binary system in slow retrograde movement. The proper motion is very small, 0″015 in the direction of 277°6 (Auwers).

A and B

1875.66	20°4	0″46	6*n*	Δ	6.7...6.7
1877.76	20.9	....	1*n*	Cin	6.0...6.0
1878.19	2°49	0″58	4*n*	β	
1879.25	19.6	0.66	4*n*	Cin	5.9...6.0
1879.30	19.1	0.52	2*n*	Sp	6.8...6.8
1879.70	16.1	0.73	1*n*	β	6.0...6.0
1886.72	16.8	0.78	2*n*	LM	6.2...6.4
1888.65	14.1	0.60	3*n*	Lv	6.8...7.9
1888.74	18.3	0.60	7*n*	T	6.5...6.5
1889.53	12.8	0.53	2*n*	Sp	
1891.55	14.9	0.67	5*n*	T	
1891.59	12.1	0.68	3*n*	β	
1894.93	7.6	0.61	7*n*	Com	
1896.77	6.3	0.65	6*n*	A	
1897.88	10.4	0.67	3*n*	Hu	
1898.79	10.5	0.88	2*n*	Bryant	
1898.90	5.2	0.58	1*n*	β	
1900.66	4.4	0.6±	2*n*	Solá	
1901.80	3.7	0.61	3*n*	A	
1901.80	350.6	....	4*n*	Do	
1901.88	7.0	0.59	9*n*	Bryant	
1902.30	7.4	0.73	6*n*	Doo	
1903.87	2.3	0.70	2*n*	Biesbroeck	

The distant stars noted by Herschel have never been measured before, and are too remote to be of any interest.

AB and C

1898.90	341°9	54″44	1*n*	β	...11.0

AB and D

1898.90	190°6	113″68	1*n*	β	...10.0

AB and E

1898.90	133°3	132″39	1*n*	β	... 9.3

[3 (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β1...β2...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)...Δ (2086)...Cin4...Cin5...LM...Lv1...T (2991, 3186)...Sp (**II, III**)...Com. (**X**)...A (3396)(*A. J.* 429)(*Bul. L. O.* No. 11)...Do (3799)...Hu (*A. J.* 427)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 514; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)....Solá (3679)....Biesbroeck....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11695. **H** 1758. Double in *A. G. Cambridge.* In DM 9.1m. 18m 6s

1879.61	260°0	11″13	1*n*	Cin5	9.0... 9.0
1901.43	259.1	10.87	2*n*	Ku	10.2...10.5
1903.89	258.7	10.89	3*n*	Howard	

[Cin5...Kustner (3821)...Kirkwood Obsy...]

11696. **Σ 2903.** (= **Sh 343**) Relatively fixed, but common proper motion of 0″046 in 96°3 (Schroeter). 18 10

1868.27	95°1	4″18	4*n*	Δ
1879.56	94.8	4.22	1*n*	β
1889.74	95.2	4.31	2*n*	Hl
1905.80	95.3	4.10	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....H1....Bp....Wr....H (**IV**)....Ra (**XXIV**)....Δ (1125, 1195)....Δ (**I, II**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)....β3....Jones (*Proc. Haverford Coll. Obsy.* 1892)....Hl (**II**)....Glasenapp (**II**)....β6...]

(See p. 1085)

11698. **Espin 104.** Discovered by Espin. 18 21

1905.88	47°4	7″06	2*n*	β	8.5...13.2

[Espin (3784)...β6...]

18m 23s **11699.** **Σ 2901.** Probably unchanged.

1868.20	145°1	2″98	4*n*	Δ
1895.22	145.9	2.70	4*n*	Gla
1902.53	145.5	3.22	2*n*	Hu

[Ma (*F. S.* I)....Ma (XI)....H (V)....Δ (II)....Cin5....Cin6....UL....Glasenapp (II, V)...*Annals Toulouse Obsy.* III...]

18 31 **11701.** **Weisse 38.** "Duplex 6″" in W². Measures by β⁵. No other observations.

18 32 **11702.** **Σ 2902.** (= **H̥ N. 64 = Sh 344.**) Without change. (See No. 10122.)

1869.87	90°2	6″34	5*n*	Δ
1891.66	88.8	6.20	4*n*	Gla
1897.81	88.5	6.21	4*n*	Coleman
1902.46	90.0	6.59	2*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...Wr...Bp...Se...H (IV)...Ra (XXIV)...Du...Δ (1125)....Δ (I, II)....Glasenapp (III)....Do (3681)....*Annals Toulouse Obsy.* III.... Espin (*Mon. Not.* LXII, 530)....Furner (*Mon. Not.* LXIV, 806)....Coleman (*Mem. R. A. S.* LIV)...]

18 42 **11704.** **β 843.** Discovered wtth the 15½-inch at the Washburn Observatory. Perhaps change in angle.

1886.83	229°5	3″23	2*n*	UL
1888.01	233.6	3.26	3*n*	Com
1897.94	234.4	3.57	1*n*	Brown
1899.81	229.8	3.64	4*n*	Doo

[β (XII)....β⁴....UL....Com (VI)....Brown (3646)....Doolittle (*Pub. Flower Obsy.* I)...]

19 6 **11705.** **Ho 183.** The other measures are:

1895.44	217°9	2″24	3*n*	Ho
1902.23	216.2	2.35	6*n*	Doo
1902.62	219.0	2.78	2*n*	β
1903.74	219.3	2.36	1*n*	Lewis

[Ho (2779, 3558)...β⁶...Lewis (*Mon. Not.* LXVI, 32)...]

19 10 **11707.** **A 412.** A star 14 m, 73°7 : 22″3.

[A (*Bul. L. O.* No. 29)...]

19 15 **11708.** **S 808.** *Yellow : fine blue,* H (V). "Duplex" in O. Arg. S. Probably fixed.

1896.59	150°8	6″81	2*n*	Lv	8.0...9.0
1897.69	151.3	6.88	2*n*	See	5.7...7.2
1903.73	149.1	7.09	2*n*	Scott	7...8

[Lv (*A. J.* 407)...Soulé (*A. J.* 410.)..Scott (*Brit. Ast. Ass'n* VIII, 66)(*Mon. Not.* LXIV, 52)...See (3496)...]

19 19 **11709.** **H 5527.** No star of this magnitude in or near this place in the DM.

11710. **H 3113.** (= **H 295.**) The principal star of this is C of H 295. The only measures are: 19m 40s

AB	1905.58	187°0	12″67	1*n*	β⁶
AC	1905.58	318.8	23.73	1*n*	β⁶

11711. **H 963.** Distance much underestimated by Herschel. 19 41

1902.61	60°4	6″93	2*n*	β⁶	9.5...10.0

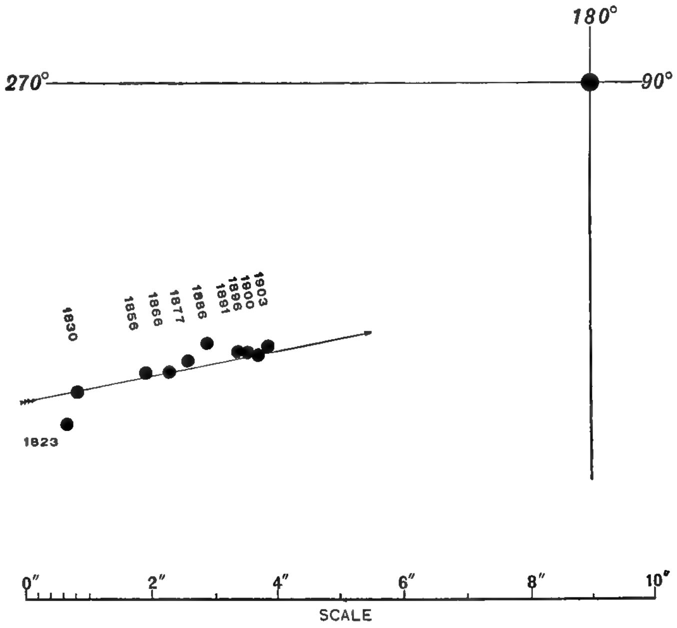
11712. **Ho 616.** Change in angle and distance? 19 43

1904.70	358°8	19″44	3*n*	Doo

[Ho 3558)...]

11713. **A. G. 282.** Double in *A. G. Leiden.* Measures by β⁶. 19 46

11715. 53 *Aquarii.* **Sh 345.** (= **H̥ N. 41** = σ 752; CD = **β 1307**). The proper motion of the large stars is given from meridian positions: 20 3



53 Aquarii.

A = 0″203 in 90°0 Porter
0.201 in 95.7 Bossert
0.215 in 92.9 Paris
B = 0.212 in 84.3 Porter
0.230 in 85.0 Bossert
0.240 in 90.0 Paris

Porter says the value for the preceding star of the large pair (Bradley 2953) is somewhat uncertain; and it is evident that if the direction of the motion of A is correct, the direction of B must be more than 90°, since the stars are approaching each other. Comparing the measures of AB in 1900 and those of Dembowski in 1866, with Porter's proper motion of A, we have 0″244 in the direction of 91°7 for the movement of B. The nearest approach of the components will occur in about 145 years, when the distance between them will be only 2″. This system is like that of 61 *Cygni*, and a large number of similar pairs, where the respective components have nearly the same movement in space.

Some of the measures of AB are very discordant. The following positions are shown on the diagram:

1823.86	303°1	10″03	2n	Sh
1830.67	301.0	9.59	1n	H
1856.69	303.2	8.53	1n	Se
1866.37	304.5	8.20	3n	Δ
1877.70	304.7	7.87	3n	Cin
1886.86	304.2	7.44	3n	Hl
1891.69	307.4	7.15	3n	Collins
{1896.55	308.7	7.34	3n	Hu
{1896.63	307.5	6.65	2n	Scott
1900.73	309.4	6.93	3n	β
1903.76	309.2	6.72	5n	Jouffray

In measuring the faint star C as a check hereafter on the proper motion of AB as given from meridian positions, it was found to be a rather difficult pair. C has not been measured before.

[H^1....H (**II**)....J^2....Se^1....Bp....Hd....Flm....Pt....Cin^3....Cin^4....Cin^6.... Wilson (Cin^{10})...Δ (**I**)...Engelhardt (**II**)...Hl (*Wash. Obsns.* 1886)...Hl (**II**) ...Collins and Jones (*Proc. Haverford Coll. Obsy.* 1891–2)...Glasenapp (**I**)... Scott (*Brit. Ast. Ass'n.* **V**, 75; **VI**, 250; **VIII**, 66)...Do (3378, 3799)...Hu (*A. J.* 397)...Solá (3497, 3679)...Jouffray (*Bul. Ast.* **XXI**, 299)...β^5...]

$20^m\ 31^s$ **11716.** 34 *Pegasi.* **β 290.** Discovered with the 26-inch at the Naval Observatory. The relative change is slow, but it is certain that this is a physical system. The components have a large proper motion:

Auwers	0″259 in 80°7
Porter	0.259 in 81.1

If the small star was fixed in space, the angle and distance would increase respectively 26° and 5″5 during the time covered by the measures.

1875.77	223°3	2″61	2n	Hl
1878.49	218.9	2.62	5n	β
1885.74	214.0	3.07	1n	HΣ
1889.63	218.7	2.71	3n	β
1898.61	217.8	2.83	3n	β
1898.73	218.4	3.08	2n	A

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β^3...β (2957)(*Pub. L. O.* **II**)...Hl (**I**) ...A (3585)...HΣ (**XII**)...]

20 59 **11720.** **Σ 2904.** Probably no change.

1868.41	311°2	7″90	4n	Δ
1892.63	309.8	7.58	2n	T
1892.67	311.4	7.54	2n	Gla
1902.60	310.7	8.26	2n	Hu

[Ma (*F. S.* **I**)....Ma (**X**)....Mh....Se....H (**V**)....Δ (**II**)....Cin^5....T (3185).... Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

21 0 **11721.** **H 1764.** The only measure is:

1904.57	172°5	32″57	2n	β^6	9.2...11.7

11722. **H 3115.** Nothing later but this: $21^m\ 3^s$

AB	1902.65	263°9	33″02	2n	β^6	7.6...10.5
AC	1902.65	330.0	41.30	2n	β^6	...11.5
AD	1902.65	95.4	57.52	2n	β^6	...10.5

11723. **H 3116.** "Pos. from diagram." 21 15

1902.09	257°7	25″73	2n	β^5	9.5	12.5

11724. **Ho 185.** Change in angle? 21 15

1884.84	155°6	2″73	2n	Ho
1895.09	164.2	2.16	3n	Ho
1902.73	166.5	2.24	5n	Doo

[Ho (2779, 3558)...]

11725. **H 3114.** The measures are discordant in distance. 21 20
It is not likely to be motion.

1877.78	93°7	7″90	2n	Cin	7.7...9.0
1892.92	94.2	6.84	2n	Jones	7.9...8.8

[Cin^4...Jones (*Proc. Haverford Coll. Obsy.* 1892)...]

(See p. 1085)

11726. **Σ 2905.** No change. 21 20

1865.67	283°5	3″25	3n	Δ
1892.87	283.3	3.30	2n	Jones
1893.66	284.2	3.37	2n	Gla
1902.24	283.9	3.33	3n	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H^1...H (**IV**)...Se...Δ (**II**)...Glasenapp (**III**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...*A. G. Leipzig*, p. 211...*Annals Toulouse Obsy.* **III**...Furner (*Mon. Not.* **LXVI**, 32)...]

11727. **Ho 184.** The other measures are: 21 21

A and B

1895.69	293°9	1″91	2n	Ho
1902.74	291.1	2.33	5n	Doo

A and C

1895.69	315°7	44″11	2n	Ho

[Ho (2779, 3558)...]

11728. **Σ 2906.** Probably unchanged. 21 26

1865.73	1°6	4″30	3n	Δ
1879.57	3.2	4.03	1n	β
1903.62	3.8	4.15	3n	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^3...Espin (*Mon. Not.* **LXIV** 677)...Greenwich Obsy. (*Mon. Not.* **LXIV**, 806; **LXVI**, 32)...β^6...]

11731. **β 700.** Discovered with the 18½-inch. β 380 is in the field 27^s *f* and 1′*n*. The other measures are: 21 35

1877.70	332°4	10″33	1n	Δ
1893.78	335.8	9.96	3n	Wilson
1902.41	333.8	10.09	3n	Doo

[β (**X**)...β^1...Δ (**I**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

21^m 39^s **11732.** **β** 291. This star was suspected with the 6-inch to be a close pair in 1872, and verified by me with the 26-inch at Washington in August 1874. It is a difficult object with a small aperture. It is clearly a binary. Both angle and distance are increasing; and it is much easier now than it was at the time of discovery. This pair is within the triangle of 6m stars formed by 34, 35, and 37 *Pegasi*. The first of these bright stars is β 290, and the last Σ 2912.

All the measures are given.

A and B

1875.82	157°.8	0″.33	4*n*	Δ
1878.64	160.0	0.42	1*n*	β
1880.08	165.5	0.50	2*n*	β
1886.77	162.9	0.38	1*n*	LM
1889.63	167.5	0.46	3*n*	β
1890.58	164.8	0.40 ±	7*n*	Sp
1893.75	173.8	0.47	2*n*	Wilson
1894.74	168.4	0.30 ±	6*n*	Sp
1898.75	173.5	0.52	3*n*	A
1898.77	172.2	0.52	3*n*	Bryant
1900.73	168.8	0.32	2*n*	Bryant
1901.06	175.3	0.43	5*n*	Doo
1901.78	167.7	0.38	3*n*	Lewis
1903.98	180.9	0.45	1*n*	Biesbroeck

AB and C

1898.78	125°.0	31″.06	1*n*	A
1899.76	125.0	31.90	1*n*	Lewis

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β^3...β (2957)(*Pub. L. O.* **II**)...Δ (**I**)...LM....Sp (**III**)....Wilson (   )....A (3585)....Bryant (*Gr. Obsns.* 1898)....Greenwich Obsy. (*Mon. Not.* **LX**, 515; **LXII**, 383; **LXIII**, 403)...Biesbroeck...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

(See p. 1085)

22 2 **11735.** **β** 380. (AC = **OΣ (App)** 234.) The small stars noted with the 6-inch. The other measures are:

A and B

1893.67	322°.5	24″.93	3*n*	Wilson	7.8...10.3
1903.52	323.0	25.23	3*n*	Doo	7.7...10.7
1905.93	322.8	24.89	1*n*	β	...11.3

A and C (= OΣ App. 234)

1886.52	134°.2	36″.36	4*n*	Franz
1893.67	134.2	36.15	3*n*	Wilson
1903.52	133.8	36.28	3*n*	Doo
1905.93	134.6	36.10	1*n*	β

C and D

1893.73	243°.1	21″.34	3*n*	Wilson	...12.8
1903.52	242.8	21.43	3*n*	Doo	...12.5
1905.93	240.5	20.93	1*n*	β	...13.0

There is a 13.5 m star from A, 86°.8 : 23″.5, and a still fainter star near it.

[β (**VI**)...β (2062)...Δ (**I**)...Franz (3080)...Wilson (   )...β^6...Doolittle (*Pub. Flower Obsy.* **II**)...]

22 10 **11736.** **β** 701. Discovered with the 18½-inch. The proper motion of the principal star is given:

Porter	0″.166 in 79°.6
Glasgow	0.227 in 71.8
Paris	0.201 in 83.4

The companion is evidently moving with it. The relative change is principally in angle. All the other measures are given.

1878.24	279°.9	1″.24	2*n*	β
1887.59	273.9	1.31	5*n*	HΣ
1893.69	277.2	1.18	3*n*	Wilson
1897.89	268.0	1.42	1*n*	Brown
1900.79	267.7	1.46	3*n*	Doo
1903.18	261.8	1.05	2*n*	Lewis

[β (**X**)...β^1...Δ (**I**)...Wilson (   )...HΣ (**XII**)...Brown (3646)...Doolittle (*Pub. Flower Obsy.* **I**)...Lewis (*Mon. Not.* **LXIII**, 403; **LXIV**, 806)...]

11737. **Σ** 2908. Perhaps a little increase in the distance. 22^m 22^s

1864.93	115°.9	8″.99	3*n*	Δ
1884.37	114.9	9.22	6*n*	Per
1893.66	114.1	9.15	2*n*	Gla
1902.24	114.9	9.31	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Se^1...OΣ (**IX**)...Δ (**II**)...Per (2560, 2749)...Per...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Bowyer (*Mon. Not.* **LXIV**, 806)...]

11738. **β** 173. Discovered with the 6-inch. No change. 22 24

1892.75	232°.1	2″.90	3*n*	Wilson
1903.04	232.2	2.97	3*n*	Doo

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Δ (**I**)....Wilson (   )....Doolittle (*Pub. Flower Obsy.* **II**)...]

11740. **H** 1768. "Fine." These are the only measures: 22 27

1879.52	7°.7	24″.70	1*n*	Cin^5	8.5...9.0
1905.58	8.7	24.50	2*n*	β^6	8.5...8.6

11741. **Σ** 2910. There may be a little change in the angle. 22 31

1832.14	347°.2	5″.30	3*n*	Σ
1852.10	344.7	5.27	3*n*	Ma
1856.75	344.2	5.30	2*n*	Wr
1865.68	343.1	5.32	3*n*	Δ
1868.44	343.8	5.39	3*n*	Du
1888.43	341.0	5.39	3*n*	HΣ
1888.84	341.5	5.43	3*n*	Hl
1893.68	341.9	5.25	2*n*	Gla
1902.20	340.7	5.49	3*n*	Hu
1903.64	339.9	5.28	1*n*	Do
1903.84	339.1	5.49	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...Wr...Du...Flm...Δ (**II**)...WS...WS^2...Gl...Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (3023, 3931)...Big...Hl (**II**)...Glasenapp (**III**)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Thiele (3837)...Sk^5...Bowyer (*Mon. Not.* **LXIV**, 806)...Lau (*Bul. Ast.* **XXII**, 238)...]

11742. **β** 1218. Discovered with the 12-inch. Evidently unchanged. The following are all the other measures: 22 33

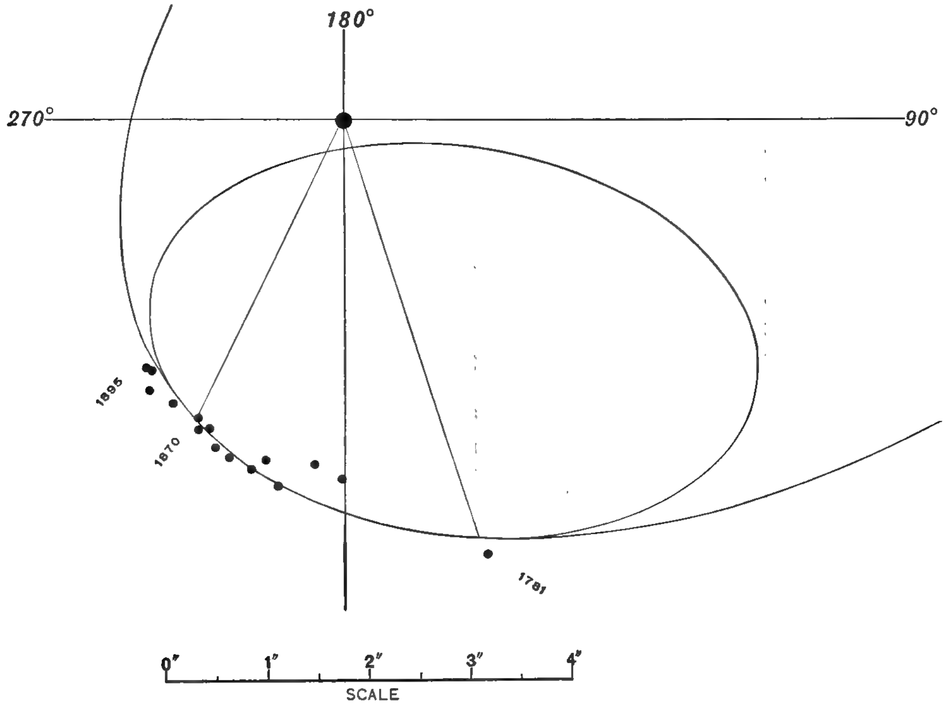
1890.95	51°.0	1″.15	2*n*	Ho
1892.16	55.0	1.42	4*n*	Sp
1892.93	57.2	1.10	2*n*	Jones
1893.94	54.5	1.42	3*n*	Sp
1896.77	52.7	1.33	3*n*	A
1897.95	52.6	1.62	9*n*	Lewis
1899.83	54.2	1.48	12*n*	Bowyer
1900.27	52.3	1.50	2*n*	Bryant

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...Ho (3234)...Sp (**III**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 424; **LX**, 515; **LXI**, 486; **LXIII**, 403)...A (3466)...]

$22^{m}\ 39^{s}$ **11743.** ζ *Aquarii.* **Σ 2909.** (= **♅ II. 7 = Sh 346.**) The relative motion is retrograde, and very slow. The components have a considerable proper motion, which is given:

Auwers	0″.170 in 75°.7
Paris	0.196 in 78.8

Doberck, using the measures to 1870, computed the orbit (A. N. 2050; Trans. R. I. Acad. XXV), and found a period of 1578.33 years; but as the total arc described down to that date was only 43°, of which only 25° was represented by measures that could be properly used, the result was necessarily of no value. Herschel's distance in 1781 is too uncertain to be considered in any investigation of the relative motion. His measures run from 4″.22 to 5″.62. This orbit is shown on Fig. 1 (reproduced from *Popular Astronomy*, IV, 474). The small ellipse, which is an impossible orbit, is merely to show that this short arc can be equally well represented by an almost infinite variety of curves, and that therefore we know absolutely nothing at this time of the form of the apparent orbit, or the elements of the real orbit. An ellipse which will enclose the principal star, and give an eccentricity of 0.9, the highest eccentricity of any known double star system, will require a period of about 350 years, which may be considered as the minimum periodic time.



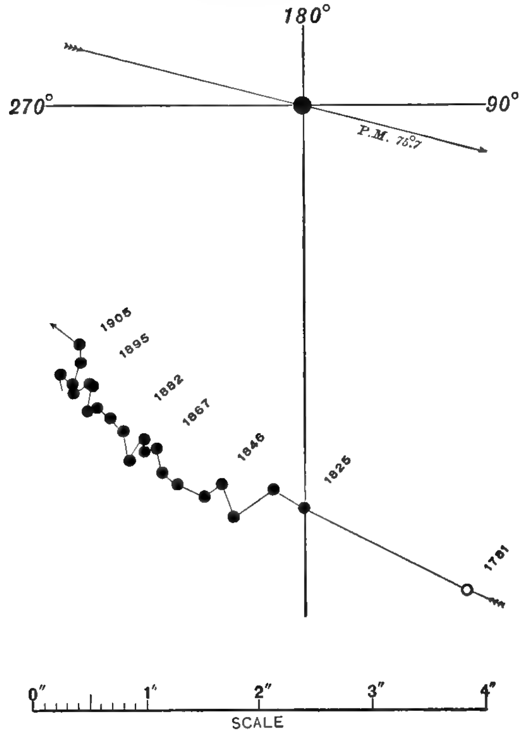
ζ Aquarii. *Fig. 1.*

It is evident that neither by computation nor conjecture can any one at this time be reasonably certain of naming a period which shall be within one thousand years of the correct time. As a matter of fact, it is not yet satisfactorily proven that this is a binary at all. So far as the observations are concerned it might be a system of the 61 *Cygni* type, where the change is apparently due to a small difference in the proper motions of the components. The probabilities, however, are that the change is due to orbital motion.

The following measures, which are shown on Fig. 2, are sufficient to illustrate the movement during the last eighty years:

1781.28	18°.4	4″.56	4*n*	♅
1825.73	359.8	3.60	2*n*	Σ
1832.81	355.3	3.46	5*n*	Σ
1839.77	350.1	3.73	6*n*	Da
1846.95	347.5	3.48	3*n*	Da
1853.94	345.6	3.61	3*n*	Wr
1858.15	341.5	3.57	9*n*	Δ
1863.14	339.0	3.52	15*n*	Δ
1867.53	336.9	3.34	9*n*	Δ
1872.15	335.3	3.41	6*n*	Δ
1876.40	334°.4	3″.31	6*n*	Δ
1878.12	334.0	3.56	11*n*	Hl
1882.68	331.1	3.33	8*n*	Hl
1886.30	328.3	3.30	6*n*	Hl
1888.34	325.8	3.29	6*n*	Hl
1890.24	324.9	3.36	8*n*	Hl
1893.78	323.2	3.14	9*n*	Maw
{1895.73	322.9	3.12	3*n*	See
{1895.79	322.1	3.20	4*n*	Com
1897.72	321.7	3.31	2*n*	Hu
1900.12	318.1	3.26	7*n*	Doo
1902.86	320.5	3.24	3*n*	Do
{1903.68	319.2	3.01	3*n*	Biesbroeck
{1903.81	319.5	3.10	6*n*	Jouffray
1905.54	317.0	2.95	4*n*	β

[Ma (*F. S.* **I**)...Ma (303, 324)...Ma (**IX, X, XI, XIII, XV**)...H (**V, VII**)...H¹...H²....Ek (I)....Bes....BM (280)....Mu....Mh....Wr....K....K (409, 1519)....Miller (848)...Auwers (1393)...Bp...Da¹...Da²...Da³...Da⁴...WJ...WJ²....J²....J³....Se....Se²....Se³....Se (1017, 1614) ...P¹....Flm....*Durham Obsns.* 1846–48...Fl...Wh...Lu (I, **II, III**)...Ra (**XXI, XXVII–XXX, XXXII–XXXVI, XXXVIII, XLV**)....Ba (**I, II, III, IV**)....Pogson (*Brit. Ass'n Rep.* 1858)...Nobile (*R. della R. Acad. Sci.*, Napoli, Jan. 1875)...Giacomelli (**III**)...Du...Bru...Bru²...Hd...Pk...Pt...Pl...Kn...WS...WS²...Gl...Sk...Newcomb (*Wash. Obsns.* 1867)...OΣ (**IX**)...Do (2050, 2199, 2242, 2433, 3023, 3378, 3466, 3681, 3799, 3931)(*Trans. R. I. Acad.* **XXV, XXIX**)(*Mon. Not.* **XXXV**, 408)....Δ (1032, 1118, 1195, 1475, 1736, 1880, 2081)....Δ (**I, II**)....Δ (*Mem. Accad. Sci.*)...Je (2407, 2450, 3802)...Per...Per (2560, 2749)...Franz (2590)....de Ball (2753)....T (2866)....Cin³....Cin⁴....Cin⁵....Cin⁶....Wilson (Cin¹⁰)....Lv¹....LM....Goldney (2257)....Sp (2133)....Sp (**I, II, II** App)....Knorre (*Beob. Berlin*, No. 6, 1892)...Hl (*Wash. Obsns.* 1875, 1880, 1882, 1883, 1885, 1886)....Hl (**I, II**)....*Proc. Haverford Coll. Obsy.* 1891–2....Hl (*A. J.* 302)...Jones (*A. J.* 312)...Glasenapp (**I, II, III**)...Maw (**I, II, III, IV**)...Scott (*Brit. Ast. Ass'n.* **V**, 75; **VI**, 250)(*Mon. Not.* **LXIV**, 52)...Big (*Bul. Ast.* **XII**, 299)...Big...Cohn (3240)...Hagen (3258)...Collins (*A. J.* 378)...Com (**X**)...Knorre (3300, 3518)...Ebell (3321)...See (*A. J.* 359)...Hu (*A. J.* 397, 427)...Soulé (*A. J.* 410)....β (*Mon. Not.* **LI**, 391)(*Pop. Ast.* **IV**, 474)....Coleman (*Mem. R. A. S.* **LIII**)....Solá (3679)....Lunt (*Mon. Not.* **LXI**, 611)....Doolittle (*Pub. Flower Obsy.* **I, II**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Thiele (3837)...Sk⁵...Jouffray (*Bul. Ast.* **XXI**, 299)...Biesbroeck...Lau (*Bul. Ast.* **XXII**, 238)...β⁶...Lohse (*Pub. Potsdam Obsy*)...]



ζ **Aquarii.** *Fig. 2.*

11744. See 474. (AC = **H** 3118.) In Cord. DM 7.5 m. The later observers do not mention the Herschel companion (See No. 11766). Cogshall found the close pair rather uncertain in 1899, and less than 0″25 if double. 22m 41s

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

(See p. 1085)

11745. Σ 2907 *rej.* The only modern observation is: 22 42

AB	1902.60	157°0	36″24	2*n*	Hu
AC	1902.60	230.1	47.68	2*n*	Hu

11747. **Hd Zones.** (= **Ku** 65.) Noted as double in the *Harvard Zones.* 22m 53s

1901.86	182°9	3″50	2*n*	Ku

[β⁵...Kustner (3821)...]

11748. **Kr** 59. Noted "duplex" in *A. G. Hels.* 22 53

1899.16	163°6	1″81	5*n*	Doo	9.1...9.3

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11750. **β** 174. Discovered with the 6-inch. Probably unchanged. 22 58

1878.77	290°6	9″09	2*n*	Cin	8.0...12.0
1881.61	292.6	9.08	3*n*	β	8.1...11.3
1888.77	291.7	8.62	3*n*	β	8.3...10.7
1898.84	292.4	9.06	2*n*	β	8.0...10.5
1900.21	291.6	9.24	6*n*	Doo	8.2...10.6

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (2875)...β⁴...β (*Pub. L. O.* **II**)...Δ (**I**)...Cin⁵...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

11752. **β** 478. (= **Hu** 387.) Discovered with the 6-inch. The middle of three stars in the field. Unchanged. Boothroyd measures a 13.5 m star from A, 54°7 : 18″92 (1898.71) 2 *n*. 23 8

A and B

1886.80	32°2	1″38	1*n*	LM	9.6...11.2
1898.72	30.6	1.62	2*n*	Bd	8.5...10.2
1898.75	32.4	1.23	3*n*	A	9.2...10.3
1898.84	30.1	1.24	1*n*	β	8.6... 9.3
1901.76	33.2	1.65	3*n*	Hu	9.0...12.0

A and C

1898.72	239°4	28″69	3*n*	Cg	... 8.7
1898.74	239.2	29.08	2*n*	A	... 9.0
1898.84	239.7	28.67	1*n*	β	... 8.7

[β (**IX**)....β (*Mon. Not.* **XXXVIII**, 78)....β¹....LM....Boothroyd (*A. J.* 478)....Hu (*Bul. L. O.* No. 12)...A (3585)...]

11754. **OΣ** 471 *rej.* Excluded as single in the second edition of the *Poulkowa Catalogue.* Ma (XI) gave, 6°8 : 0″22 (1843.64) 2*n*, but no observer since has seen any elongation, and it is practically certain that the measure of Ma is erroneous, and that this star is not really double. 23 15

[Ma (**XI, XIII**)...Δ (**I**, p. 230)...β¹...Hu (*Pub. L. O.* **V**)...]

11755. **H** 1773. "Double." No prominent pair found here on one occasion (1875); probably faint stars. Espin could not find it in 1901 (*Mon. Not.* LXII, 533), and I failed to identify it in measuring No. 11764. 23 21

11756. **β** 76. Discovered with the 6-inch. In a low-power field with ζ *Aquarii.* No relative motion. An earlier observation is found in *Harvard Annals*, where it is said to have been "recently discovered by Alvan Clark." 23 23

1867.86	332°.1	1″.50	1*n*	Hd
1876.24	335.3	1.47	4*n*	Δ
1879.18	333.6	1.48	4*n*	Cin
1888.85	338.2	1.24	1*n*	Lv
1891.71	334.0	1.42	4*n*	T
1898.65	337.1	1.46	3*n*	Bd
1901.77	333.8	1.51	3*n*	Doo

[β (I)....β (*Mon. Not.* **XXXIII**, 351)....Hd....Δ (I)....Cin[5]....Lv[1]....T (3186).... Boothroyd (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* II)...]

23^m 30^s **11758.** **H 965.** The only measure is:

1904.74	140°.8	29″.78	3*n*	Espin	8.4...9.2

[Espin (*Mon. Not.* **LXVI**, 143)...]

23 32 **11759.** **β 844.** Discovered with the 15½-inch at the Washburn Observatory. Without change. The later measures are:

B and C

1886.84	317°.7	3″.25	4*n*	UL	
1887.79	316.5	3.44	2*n*	Com	9.0...10.7
1888.88	310.7	....	3*n*	Lv	8.8...11.2
1891.86	316.1	3.30	1*n*	β	9.7...10.8
1902.31	317.2	3.14	3*n*	Doo	9.4...11.4

A and B

1886.84	34°.2	98″.81	4*n*	UL
1891.86	34.3	98.25	2*n*	β

[β (XII)...β[4]...β (3114)...β (*Pub. L. O.* II)...Lv[1]...Com (VI)...UL...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* II)...]

23 32 **11760.** **A 187.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

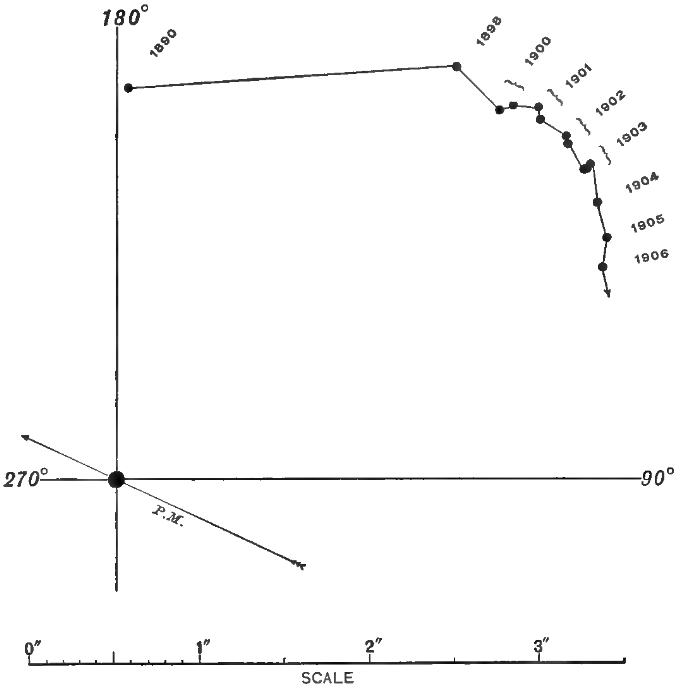
23 43 **11761.** **Kr 60.** Noted by Krueger in *A. G. Hels.*, "dupl. 12″ pr. Com. 9.3" in 1873.7. It was measured at Mt. Hamilton in 1890 and a much nearer companion found. When re-observed by Doolittle in 1898 a very decided change had taken place in the positions of both the small stars, and it is now known that the principal star has a very large proper motion for a star of this magnitude, and that the change in AC is entirely due to this movement, which is identical with that given by comparing A with other DM stars in the vicinity; and therefore C is fixed in space. The distance of that star is increasing nearly 1″ per year, with no material change in the position-angle. It will be seen that Krueger's description is erroneous as to the direction of the companion at that time. It should be "following" instead of "preceding." In 1873 the small star C was about 12″ distant from A in the direction of nearly 60°. As B is much smaller, it is not likely to have been noticed in a meridian instrument, and in any case, the other would be remarked at the same time.

At first it appeared probable that there was some error in the single measure of distance in 1890, and that the change in AB was due to the difference of the two proper motions, thus making a system of the 61 Cygni type. These stars have been carefully and frequently measured during the past seven years, and there is but little doubt of their forming a true binary system. The mean yearly motion in angle is about 4°, with very little change in the distance since 1898. The measures of the next twenty years will furnish some indication of the general path of the companion. The period cannot be a short one, but it is not unlikely that the maximum distance may be covered by the measures now made.

The following are all the measures:

A and B

1890.79	178°.8	2″.32	1*n*	β
1898.45	140.7	3.19	5*n*	Doo
1900.74	134.0	3.18	4*n*	Doo
1900.94	133.4	3.25	4*n*	Bar
1901.37	131.4	3.35	4*n*	β
1901.77	130.4	3.31	7*n*	Bar
1902.71	(122.0)	(3.49)	1*n*	Lewis



Kr 60. AB.

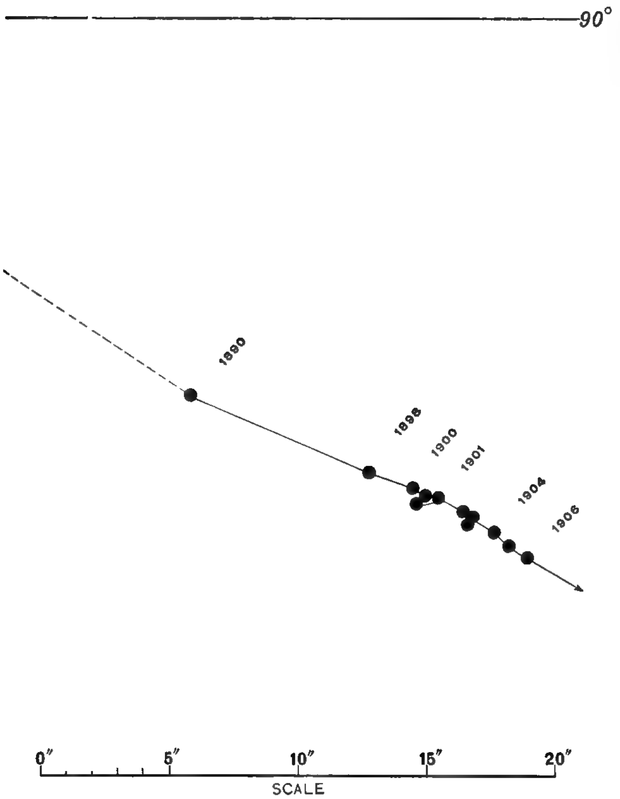
1902.76	127°.3	3″.37	3*n*	Bar
1902.78	126.1	(2.99)	3*n*	Doo
1902.81	126.5	3.36	4*n*	β
1903.46	123.4	3.35	7*n*	β
1903.46	123.4	3.36	9*n*	Bar
1903.63	123.5	3.39	6*n*	Doo
1904.60	119.9	3.31	3*n*	β
1905.45	116.2	3.26	6*n*	β
1906.00	113.8	3.15	4*n*	β

A and C

1890.79	56°.3	26″.82	1*n*	β
1898.45	58.7	34.39	5*n*	Doo
1900.74	59.2	36.18	4*n*	Doo
1900.94	59.3	36.71	4*n*	Bar
1901.37	58.6	36.55	4*n*	β
1901.77	59.6	37.27	7*n*	Bar
1902.76	59.6	38.29	3*n*	Bar
1902.78	59.6	38.64	3*n*	Doo

1902.81	59°.4	38″.29	4*n*	β
1903.47	59.0	38.68	8*n*	β
1903.46	59.4	38.73	10*n*	Bar
1903.63	59.4	38.84	6*n*	Doo
1904.60	59.5	39.68	3*n*	β
1905.45	59.3	40.48	4*n*	β
1906.01	59.3	41.35	5*n*	β

The most probable value of the proper motion of A from all the measures of AC is 0″.942 in 245°.2. Other faint stars in the field have been measured.



Kr 60. AC.

1900.94	99°.0	67″.83	3*n*	Bar
1901.34	98.5	67.08	3*n*	β
1901.77	98.9	68.39	7*n*	Bar
1902.77	98.2	69.04	2*n*	Doo
1903.48	97.9	69.34	6*n*	Bar
1906.07	96.5	71.61	1*n*	β

A and DM (56°) 2784

1873.2	151°.9	195″.35		*A. G. Hels.*
1901.37	144.6	199.40	4*n*	β
1906.08	143.1	200.43	3*n*	β

These measures of the DM star give practically the same proper motion of A, 0″.929 in 247°.0.

[β (3042)(*Pub. L. O.* **II**)....Barnard (*A. J.* 488, 546)....Lewis (*Mon. Not.* **LXIII**, 415)...Doolittle (*A. J.* 486)(*Pub. Flower Obsy.* **I, II**)...$β^5$...$β^6$...]

11762. A 783. With another measure (*Bul. L. O.* No. 61) the mean is: $23^{m}\ 47^{s}$

1904.56 182°.5 4″.14 2*n* A 9.0...10.5

11763. 37 *Pegasi*. Σ 2912. This binary system has been difficult to measure with ordinary apertures, and many of the observations are discordant and uncertain. The early measures seem to cover the maximum separation of the components in the second quadrant. The distance then steadily decreased until about 1891, when the companion passed into the fourth quadrant, and was first measured there by Aitken in 1896. 23 54

Gore, from the measures to 1890, found a period of 117.54 years (A. N. 3129). This result depended wholly upon the position of 1890, the angle of which was first given as 347°.0, and if that had been properly quadranted, the period should have been approximately correct, but in 1891, on three very favorable nights, the star appeared single in the 36-inch, and therefore it seemed certain that the angle should have been given 167°.0. As the distance at that time did not exceed 0″.1, the quadrant would necessarily be uncertain in the measure. The observations in the last ten years are numerous and well distributed, but it is impossible to say whether or not the maximum distance has been reached in this quadrant.

The system has considerable proper motion:

Auwers	0″.148 in 202°.0
Paris	0.149 in 194.5
Boss	0.151 in 194.2

The following are all the measures:

1831.12*	112°.6	1″.16	3*n*	Σ
1835.67*	115.6	1.15	2*n*	Σ
1839.69*	119.0	1.22	1*n*	Da
1841.64	106.2	0.65	2*n*	Ma
1841.65*	123.5	1.13	1*n*	OΣ
1841.88	118.1	....	2*n*	Da
1842.80*	121.1	0.85	3*n*	Ma
1843.65*	120.1	0.82	2*n*	Ma
1843.85*	116.7	1.11	2*n*	Da
1845.51*	115.8	0.79	1*n*	Ma
1845.57*	121.8	0.97	1*n*	Mh
1847.98*	123.9	0.85	1*n*	Ma
1851.85*	126.2	0.67	1*n*	Ma
1851.89	114.4	1.31	1*n*	Σ
1852.67*	116.4	0.83	1*n*	OΣ
1853.88	118.7	1.11	1*n*	Da
1853.94*	122.8	0.81	1*n*	Ma
1854.74*	118.5	0.91	3*n*	Da
1854.78	114.2	....	1*n*	Ma
1855.82	118.4	....	1*n*	Ma
1856.78	127.7	0.6±	1*n*	Ma
1857.09*	117.9	0.74	4*n*	Se
1857.87	116.3	0.7±	2*n*	J
1858.00	128.2	....	2*n*	Ma
1859.87*	129.3	0.6±	1*n*	Ma
1860.69	119.8	....	1*n*	Da
1861.98*	148.0	0.4±	2*n*	Ma
1863.66	113.2	....	3*n*	Δ
1866.71	(99.1)	0.5±	2*n*	Winlock
1866.67	(96.6)	0.5±	1*n*	Searle
1866.69	(132.9)	....	1*n*	Searle
1866.76	(116.4)	....	1*n*	Searle
1867.65	111.8	....	1*n*	Δ

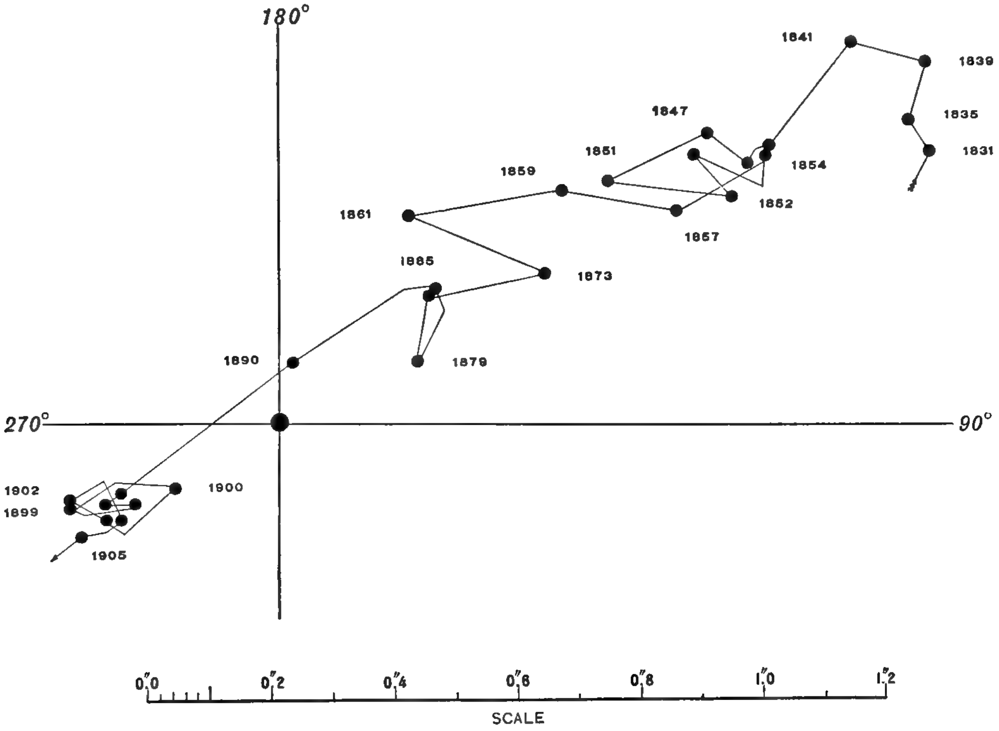
1868.76	(138°)	...	1*n*	Pierce
1869.67	(132.0)	....	1*n*	Pierce
1869.75	(114.8)	....	1*n*	Pierce
1871.92	(122.3)	0″.5±	1*n*	WS
1872.56	116.7	Obl.	1*n*	Δ
{1873.68*	119.3	0.5±	1*n*	WS
{1873.87*	119.6	0.5±	1*n*	Gl
1873.88	130.6	Obl.	1*n*	Δ
1877.75	118.8	0.3?	1*n*	Δ
1878.63*	130.0	0.32	1*n*	β
1879.57*	113.4	0.25±	1*n*	β
1879.86	128.3	....	1*n*	Sk
1885.53*	131.4	0.34	5*n*	En
1890.56*	167.0	0.1±	2*n*	β

[Ma (*F. S.* **I**)...Ma (**IX, X, XI, XII, XIII, XV**)...H (**V**)...Bp...Da²...Da³...Da⁴...Mh...J³...Se...Se²...Hd...Flm...WS...WS²...Gl...Sk...Do (2199) (*Trans. R. I. Acad.* **XXIX**, Part 13)...OΣ (**IX**)...Δ (**II**)...En (2742)...Per...Per (2749)...LM ?...Glasenapp (**II, III**)...Gore (3129)...β¹...β³...β (2957, 3048, 3114)....β (*Pub. L. O.* **II**)(*Ast. and A.-P.* **XII**, 678)....A (3396, 3466, 3639)(*Bul. L. O.* No. 11)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Brown and See (3646)...HΣ (**XII**)...Sk⁵...Biesbroeck...]

11764. ♅ **IV.** 31. The place in ♅ is a little in error; it is about 45ˢ *p* and a little *n* of δ *Cephei.* 23^m 53^s

1899.86	9°.8	25″.03	2*n*	Es	
1902.66	9.5	25.15	2*n*	β	8.5...9.3

[Espin (*Mon. Not.* **LXII**, 533)...β⁶...]



37 Pegasi. Σ 2912

1891.64	Single		3*n*	β
1896.66*	294°.1	0″.28	3*n*	A
1897.54*	295.0	0.31	3*n*	A
1897.89	297.8	....	1*n*	Lewis
1898.88*	299.6	0.27	2*n*	Lewis
1898.95	304.2	0.51	1*n*	Bryant
{1899.74*	290.2	0.34	1*n*	Bryant
{1899.76*	288.0	0.30	1*n*	Lewis
{1899.78*	292.9	0.32	3*n*	Brown
{1899.78*	293.6	0.40	3*n*	See
{1899.79*	297.0	0.27	2*n*	A
1899.83	303.1	0.6±	4*n*	Sk
1900.61*	302.7	0.20	1*n*	Hu
1901.78*	299.4	0.32	1*n*	A
1901.81	271.4	0.23	2*n*	Bryant
1902.79*	290.1	0.36	1*n*	Lewis
1903.68	285.6	0.33	1*n*	Bowyer
1903.91*	301.5	0.3±	2*n*	Biesbroeck
1905.84*	300.0	0.37	2*n*	A

11765. β 1264. Discovered with the 36-inch. It is 1ᵐ 24ˢ *f* and 9′ *n* of ζ *Aquarii.* 24 1

1898.83	19°.8	4″.17	3*n*	A

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...A (3585)...]

11766. ♅ **N.** 34. There is no description in ♅. The only pair I could find in the vicinity was H 3118 (No. 11744), and that is undoubtedly the one referred to by ♅. 24 6

11767. Σ 2913. (= ♅ **II.** 59.) Fixed. 24 14

1865.77	329°.6	7″.99	3*n*	Δ
1877.82	329.4	8.15	2*n*	Cin
1902.55	328.9	8.08	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H (**IV**)...Mh...Se...Ra (**XXIII**)...Du...Δ (1209)...Δ (**I, II**)....Cin⁴....Cin⁶....T (2899)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Collins (*A. J.* 378)...Solá (3497)...*Annals Toulouse Obsy.* **III**...Do (3799)...]

$24^m\ 20^s$ **11768.** **Hn** 169. The other measures are:

1888.70	169°0	1′89	3*n*	Com	8.8...10.0
1896.47	169.8	1.38	2*n*	Hu	

[Hn (*Pub. Washburn Obsy.* **II**)...LM...Com (**VI**)...Hu (*A. J.* 397)...]

24 22 **11769.** **A** 309. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

24 40 **11771.** **H** 296. The only measure is:

1904.56	210°1	23′88	3*n*	β^6	10.0...12.0

24 43 **11772.** *δ Cephei.* **β** 702. (AC = **Ħ** V. 4 = **Sh** 347 = **OΣ** (App) 235 = **Σ** 58, **App, I.**) The small star was discovered with the 18½-inch. The bright stars appear to have a common proper motion, but it is small, 0′010 in the direction of 151°9 (Auwers). The larger star is supposed to be variable to the extent of about 1¼ mag. in $5^h\ 8^m\ 47^s$. It was found to be a spectroscopic binary by Belopolsky (A. N. 3257, 3338).

		A and B		
1898.51	284°2	19′84	3*n*	β
		A and C (= Σ 58 App. 1)		
1867.78	191°9	40′83	5*n*	Δ
1878.65	191.9	40.88	1*n*	β
1883.32	191.6	40.88	5*n*	Franz
1898.51	191.5	40.94	2*n*	β

[β (**X**)...β^1...β (*Pub. Y. O.* **I**)...]

A few only of the measures are given of the wide pair. The observations will be found in the double-star catalogues referred to, and in the following:

[Powell (*Mem. R. A. S.* **XXV**)...Ra (**XX, XXVI**)...Schur (2255)...Goldney (2257)....Bl (**V**)....Δ (**II**)....Je (2345)....Maiebckato (*Double Star Meas.* 1892)....Franz (2650)...Glasenapp (**II**)...Do (3681)...Lau (4078)...]

25 6 **11773.** **OΣ** 472 *rej.* Excluded in the second edition of the *Poulkowa Catalogue.* No change. The proper motion in *A. G. Harvard* is 0′043 in 330°7.

1885.54	2°7	15′55	1*n*	HΣ
1898.71	0.9	15.19	3*n*	Hu
1900.76	2.4	15.61	2*n*	Espin

[Δ (**I**)...Espin (3717)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

25 46 **11778.** **OΣ** 473. No change.

1868.10	357°0	14′75	4*n*	Δ
1898.65	357.2	14.91	3*n*	Hu

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

25 50 **11779.** **Σ** 2917. Fixed. The proper motion in *A. G. Harvard* is 0′097 in 90°.

1869.09	71°4	4′50	5*n*	Δ
1894.62	70.0	4.71	2*n*	Gla
1902.47	71.5	4.78	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**IX, XI**)....Σ^1....H^1....Wr....Se....OΣ (**IX**)....H (**V**)....Ra (**XXIV**)...Δ (1195)...Δ (**I, II**)...Bp...Da^3...Du...WS...Gl...Ba (**II**)...En (2678)...Glasenapp (**III**)...]

11781. **H** 1777. Taking Herschel's position into account, it seems unlikely that the apparent change shown by the later measures is real. $25^m 54^s$

1879.52	320°0	9′82	1*n*	Cin^5	9.0...12.0
1905.88	319.0	11.60	2*n*	β^6	9.0...12.0

11783. **Σ** 2914 *rej.* From H (V). H says "described as triple by Σ, but the close star, 16m, overlooked by him. Though I have not a doubt of its reality, I must look at it again as a minimum visible." 26 5

Examined several times with the 6-inch, 1875–6, and no close pair seen. The 18½-inch failed to show anything more (1878); and so with the 36-inch in 1890, under very favorable conditions, and the 40-inch in 1904. It is therefore certain that the H companion does not exist.

The only measures of the Struve companions are of late date:

AB	1904.51	242°5	21′98	2*n*	β^6	8.1...
BC	1904.51	251.0	9.15	2*n*	β^6	11.7...11.7

11784. **Σ** 2916. Probably fixed. Espin gives a distant companion to B, not in Σ. 26 5

		A and B		
1866.62	335°4	45′25	3*n*	Δ
1895.64	335.4	45.45	1*n*	Gla
1902.47	335.2	45.02	2*n*	Hu
1905.80	335.6	44.86	2*n*	β
		B and C		
1866.62	34°3	4′12	3*n*	Δ
1895.64	32.2	3.98	1*n*	Gla
1902.47	30.0	3.64	2*n*	Hu
1905.81	33.6	3.63	1*n*	β
		B and D		
1892.80	118°0	16′56	3*n*	Es
1905.81	117.7	16.69	1*n*	β

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....Δ (**II**)....Espin (*Ast. and A.-P.* **XII**, 282)....Glasenapp (**IV**)...Furner (*Mon. Not.* **LXIV**, 806)...β^6...]

11785. **β** 1308. (AB = **H** 1776.) [The duplicity of the smaller component of H 1776 was found with the 40-inch. Herschel gives for AB, 277°5 : 5′ (1828). No other measures. 26 18

[β^5...]

11786. *a Lacertae.* **β** 703. Discovered with the 18½-inch. The proper motion of *a Lacertae* is: 26 21

Auwers	0′133 in 85°7
Paris	0.149 in 87.3

The companion is not moving with it, and it is therefore only an optical pair. The three sets of β measures give 0′139 in 88°3 for the most probable value of the proper motion of A.

1878.02	298°8	30′16	2*n*	β
1888.71	297.8	31.59	3*n*	β
1903.49	295.9	33.31	4*n*	β
1903.87	296.6	33.43	4*n*	Doo

[β (**X**)....β^1....β (2957)(*Pub. L. O.* **II**)....Doolittle (*Pub. Flower Obsy.* **II**)....β^6...]

26m 21s **11787.** **Σ 2918.** Unchanged.

1868.16	246°3	1″47	3*n*	Δ
1894.70	245.6	1.52	2*n*	Gla
1902.48	245.8	1.64	2*n*	Hu

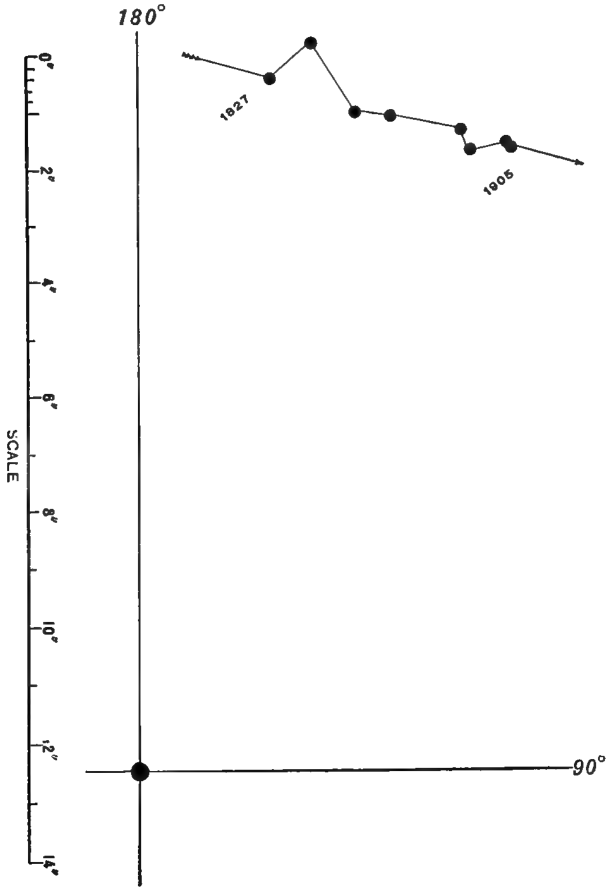
[Ma (*F. S.* **I**)...Ma (**X, XI**)...H (**IV**)...Δ (**II**)...Glasenapp (**III**)...]

26 29 **11788.** **β 479.** Discovered with the 6-inch. One of a small equilateral triangle of stars in the field; the other two brighter. This in DM is 9.2m. Probably fixed.

1893.83	31°5	2″39	3*n*	Wilson
1899.95	28.2	2.19	3*n*	Doo

[β (**IX**)...β (*Mon. Not.* **XXXVIII**, 78)...Δ (**I**)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...]

26 33 **11789.** **Σ 2915.** (= **S 809.**) One of the components has a proper motion of about 0″056.



Σ 2915.

1827.76	169°0	12″27	3*n*	Σ
1843.71	166.5	13.03	2*n*	Ma
1856.80	161.5	12.06	1*n*	Ma
1864.32	158.7	12.20	5*n*	Δ
1877.81	155.1	12.29	2*n*	β
1889.42	152.9	12.51	5*n*	HΣ
1893.69	151.5	12.27	2*n*	Gla
1897.72	148.7	12.63	2*n*	Hu
1902.54	148°8	12″62	2*n*	Hu
1902.83	149.3	12.67	3*n*	Do
1905.93	148.7	12.60	1*n*	β

[Ma (*F. S.* **I**)....Ma (**XI, XV**)....H (**V**)....Flm....Δ (1475)....Δ (**II**)....Sk....Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (**III**)...β1...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Hu (*A. J.* 427)...Solá (3679)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Sk 5...β6...]

11791. **β 704.** Discovered with the 18½-inch. Probably fixed. 27m 3s

1892.76	205°4	2″27	1*n*	Wilson
1903.39	201.7	2.17	3*n*	Doo
1904.60	207.0	2.36	2*n*	β

[β (**X**)...β1...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **II**)...β6...]

11793. **Ho 475.** Nothing later but the following: 27 7

AB	1905.75	316°8	0″82	3*n*	Doo	8.6... 8.8
AC	1905.75	223.6	7.86	3*n*	Doo	...12.1

[Ho (3234)...]

11794. **H 1779.** The other observations give a smaller angle: 27 8

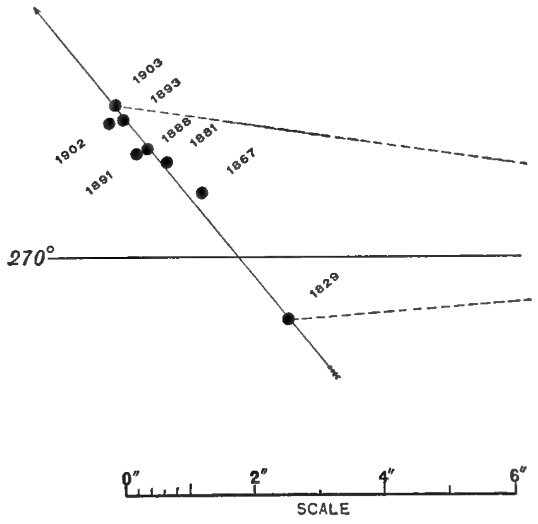
1904.69	217°2	21″31	2*n*	Espin	7.8...9.2
1905.46	217.0	22.36	2*n*	β6	8.3...9.5

11795. **β 381.** Discovered with the 6-inch. Fixed. The other measures are: 27 22

1882.68	235°5	1″54	1*n*	Perry
1891.65	232.7	1.44	3*n*	β
1901.43	230.0	1.43	2*n*	Kustner
1902.71	231.2	1.52	3*n*	Doo

[β (**VI**)....β (2062, 3114)(*Pub. L. O.* **II**)....Perry (*Eng. Mech.* **XXXVI**, 65)....Kustner (3821)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11796. **Σ 2919.** Change from proper motion. These are all the observations: 27 22



Σ 2919

1829.75	273°8	14″30	4*n*	Σ
1843.79	270.6	.....	2*n*	Ma
1867.95	266.3	15.64	4*n*	Δ
1881.74	264.8	16.24	2*n*	Big
1888.43	264.2	16.55	3*n*	HΣ

1891.63	264°5	16″72	1*n*	Toulouse
1893.70	262.8	16.96	2*n*	Gla
1902.80	263.1	17.17	2*n*	Do
1903.13	262.1	17.12	5*n*	β

The most probable value of the movement of A from the measures is 0″059 in 39°7.

[Ma (*F. S.* I)...Ma (**XI**)...Δ (1475)...Δ (**II**)...Flm...Big...Glasenapp (**III**)... *Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Do (3931)...β⁶...]

27ᵐ 36ˢ **11798.** **A. G. 283.** Double in *A. G. Harvard.* Measures by Espin (*Mon. Not.* LXII, 533).

27 47 **11800.** **Ho 293.** Change uncertain.

1895.71	345°0	0″98	1*n*	Ho
1902.72	339.8	1.10	4*n*	Doo

[Ho (2977, 3558)...Doolittle (*Pub. Flower Obsy.* **II**)...]

27 47 **11802.** **β 770.** Discovered with the 6-inch on Mt. Hamilton in 1879. Change in angle?

1891.88	352°8	1″36	3*n*	β	8.2...12.3
1898.66	348.5	1.43	1*n*	Cg	8.0...12.0
1899.80	346.9	1.57	3*n*	Doo	8.2...10.8

[β (**XI**)...β²...β (3114)(*Pub. L. O.* **I, II**)...Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **I**)...]

27 50 **11803.** **β 77.** Discovered with the 6-inch. No sensible change. This is 12′ *s* of 60 *Aquarii.* Some of the later measures are:

		A and B		
1879.58	213°8	2″62	1*n*	Cin
1886.81	212.0	2.71	4*n*	LM
1888.72	212.4	2.46	2*n*	Lv
1888.75	213.3	2.77	3*n*	β
1891.52	210.7	2.83	5*n*	T
1898.59	211.1	2.61	4*n*	Doo
1898.63	214.0	2.71	2*n*	Bd
		A and C		
1898.59	224°4	28″58	4*n*	Doo
1898.63	225.1	28.33	2*n*	Bd

[β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (2875)(*Pub. L. O.* **II**)...Δ (**I**)...Cin⁵... Wilson (Cin¹⁰)...LM...Lv¹...T (3186)...Boothroyd and Cogshall (*A. J.* 478) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

28 · **11805.** **H. C. Wilson 28.** Approximate place, and no other observations.

28 0 **11806.** **H 1781.** This is the only measure:

1905.57	288°1	21″83	2*n*	β⁶	8.5...11.5

28 6 **11807-8.** **H 1782** and **H 1783.** Two small pairs in the same field. The only measures are:

H 1782	1904.57	316°1	4″40	2*n*	β⁶	10.5...10.6
H 1783	1904.57	274.5	6.01	2*n*	β⁶	9.8...10.0
		H 1782 (A) and H 1783 (A)				
	1904.57	90°4	57″90	2*n*	β⁶	

11810. **Ho 476.** No change. 28ᵐ 15ˢ

1904.76	207°4	6″64	3*n*	Doo

[Ho (3234)...]

11812. **β 705.** Discovered with the 18½-inch. A difficult object with that aperture. I could not see it on three nights in 1898 and 1902 with the 40-inch. 28 18

HΣ found it single in 1885. In 1902 Lewis could not see anything in the 1878 position, but suspected a minute companion, 74°0 : 0″72. Doolittle in 1905 was almost certain of a 13m star, 154° : 1″8. As the duplicity of this star is somewhat in doubt, it should be watched with large apertures.

[β (**X**)...β¹...HΣ (**XII**)...Lewis (*Mon. Not.* **LXIII**, 419)...]

11813. **Ho 477.** No motion. 28 25

1904.78	165°8	12″76	3*n*	Doo

[Ho (3234)...]

11814. **Σ 2920.** (= **S 810.**) No change since 1829. Hall gives a third star, 14m, 62°5 : 22″20 (1878.87) 1*n*. 28 27

1865.25	143°2	13″68	3*n*	Δ
1881.86	143.6	13.64	4*n*	Hl
1902.07	143.5	13.70	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H¹...H (**V**)...Ra (**XXIII**)...Δ (1209)...Δ (**I, II**) ...Du...WS²...Hl (*Wash. Obsns.* 1884, 1886)...Hl (**I, II**)...Glasenapp (**II, III**)...Chofardet (3450)...*Annals Toulouse Obsy.* **III**...]

11816. **H 5345.** The only measure is: 28 41

1892.78	301°7	9″63	2*n*	Gla	9.3...10.0

[Glasenapp (**II**)...]

(See p. 1085)

11817. **β 707.** Discovered with the 18½-inch. The only later measures are: 28 46

1899.55	52°5	1″45	1*n*	β	8.5...12.0
1902.44	44.0	1.32	3*n*	Doo	8.8...11.9

[β (**X**)...β¹...Doolittle (*Pub. Flower Obsy.* **II**)...]

11818. **H 1785.** (= **Ho 478.**) Probably fixed. These are all the measures: 29 3

1892.37	172°5	13″64	2*n*	Ho	8.3...8.7
1904.78	172.3	13.89	3*n*	Doo	

[Ho (3234)...]

11820. **H 1786.** Nothing of this magnitude, and no double star in this place. After a careful examination, I am certain that there is an error of 1° in the declination of Herschel, and that H 1786 is DM (40°) 4854, the place of which is: 29 10

$$\left.\begin{array}{l}\text{R. A.} = 22^{h}\ 29^{m}\ 12^{s}\\ \text{Decl.} = 40^{\circ}\ \ 9'\ \ 20''\end{array}\right\}1880$$

The description by H agrees with the measures of this:

1904.60	226°4	43″93	2*n*	β⁶	7.6...9.0

29^{m} 13^{s} **11821.** **Ho 617.** The only later measure gives a larger distance:

1904.70	53°6	17″59	3*n*	Doo

[Ho (3558)...]

29 23 **11823.** **Hn 51.** Probably fixed. The components have a common proper motion, 0″161 in 60°3 (Boss).

1881.63	181°1	0″90	3*n*	β
1884.86	177.4	0.87	1*n*	Ho
1887.71	175.7	1.23	3*n*	Com
1903.60	178.9	0.80	3*n*	β

[β^{4}...Ho (2978)...Com (**VI**)...β^{6}...]

29 23 **11824.** **Arg. 44.** "Duplex" in O. Arg. N. A later measure is:

1901.07	348°4	7″88	4*n*	Es	8.3...8.4

[Δ (2195)...Δ (**I**, p. 376)..Espin (*Mon. Not.* **LXII**, 533)...]

29 28 **11825.** **H 966.** The following are all the measures:

1882.70	267°8	13″68	1*n*	OΣ	7.0...11.0
1885.76	268.9	13.13	2*n*	HΣ	
1902.55	268.9	13.11	2*n*	β	7.2...11.0

[OΣ (**X**)...HΣ (**XII**)...β^{6}...]

29 30 **11826.** **Σ 2927.** (= **H 3125.**) Without change.

1867.89	316°6	15″48	4*n*	Δ
1902.47	315.7	15.66	1*n*	Hu

[Ma (**XI**)...Ma (*F. S.* **I**)...Δ (**II**)...]

29 30 **11827.** **β 706.** Discovered with the 18½-inch. β 708 is closely *f.*

A and B

1881.63	16°9	2″79	1*n*	β	7.9...12.5
1898.64	17.2	2.66	2*n*	β	7.7...10.7
1898.67	15.4	2.70	1*n*	Hu	

A and C

1881.67	255°8	29″17	2*n*	β
1898.64	252.9	29.77	2*n*	β
1898.67	253.7	29.79	1*n*	Hu

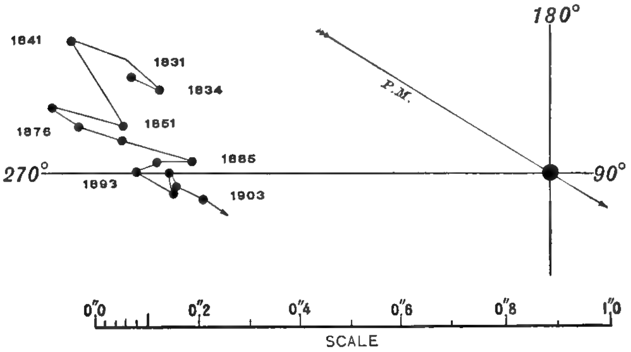
[β (**X**)...β^{1}...β^{4}...β (3114)(*Pub. L. O.* **II**)...Hu (*Bul. L. O.* No. 44)...]

29 33 **11828.** **Σ 2924.** The components have a common proper motion:

A. G. Chris.	0″122 in 58°0	
Porter	0.118 in 58.2	
Schroeter	0.114 in 63.3	

The nature of the relative change is uncertain. The motion in angle is direct, with a probable decrease in distance.

1831.76	257°3	0″84	3*n*	Σ
1834.22	258.2	0.78	6*n*	Σ
1841.12	254.8	0.97	2*n*	OΣ
1851.66	263.7	0.84	2*n*	Ma
1867.06	262.5	0.98	4*n*	Δ
1876.53	263°9	1″01	4*n*	OΣ
1876.80	265.1	0.84	24*n*	Δ
1878.99	265.6	0.84	13*n*	Hl
1885.88	268.3	0.70	3*n*	Hl
1889.40	269.5	0.85	5*n*	Com
1889.81	267.4	0.69	1*n*	HΣ
1893.82	269.8	0.81	1*n*	Big
1894.66	273.3	0.74	2*n*	Gla
1895.25	270.3	0.67	5*n*	Com
1895.87	269.7	0.82	2*n*	Collins
1900.32	272.4	0.81	4*n*	Doo
1900.67	271.6	0.66	3*n*	Hu
1903.77	274.5	0.68	2*n*	Biesbroeck



Σ 2924.

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)...H (**IV, V**)...Se...Δ (1118, 1209)..Δ (**I**, pp. 103, 394, **II**)...OΣ (**IX, X**)...Flm...WS...Gl...Sk...En (2662)...de Ball (3017)... Hl (*Wash. Obsns.* 1885)...Hl (**I**, p. 23, **II**)...Glasenapp (**II, III**)... Big (*Bul. Ast.* **XII**, 299)....Collins (*A. J.* 378)....HΣ (**XII**)....Com (**VI, X**)....Doolittle (*Pub. Flower Obsy.* **I**)...Sk^{5}...Biesbroeck...Lau (4078)...]

11829. **H 1788.** Probably unchanged. 29^{m} 38^{s}

1902.61	299°1	3″56	2*n*	β	8.6...8.9
1904.71	298.9	3.71	2*n*	Es	8.7...9.2

[Espin (*Mon. Not.* **LXIV**, 679)...β^{6}...]

11830. **Kr 61.** Noted as "duplex" in *A. G. Hels.* 29 48

1898.39	114°4	3″72	3*n*	Doo	9.0...9.7

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11832. **β 175.** Discovered with the 6-inch. Unchanged. 29 49

1893.82	318°4	1″58	3*n*	Wilson	10.0...10.0
1902.37	318.6	1.39	3*n*	Doo	10.4...10.6

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Δ (**I**)....Wilson ( )....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11833. **Σ 2921** *rej.* From H (V); "a third 11 m more distant." In DM 9.0. According to the recent measures, the angle given by H belongs to the distant star. 29 51

A and B

1902.47	211°7	20″02	1*n*	Hu	
1904.56	213.9	20.03	3*n*	β^{6}	9.0...10.6

A and C

1902.47	175°2	85″02	1*n*	Hu

29m 53s **11834.** **Σ 2923.** Fixed. The components have a small common proper motion, 0″040 in 81°5 (Schroeter).

1876.53	47°5	9″58	4*n*	OΣ
1876.76	46.9	9.38	17*n*	Δ
1878.77	46.5	9.55	10*n*	Hl
1894.66	46.8	9.48	2*n*	Gla
1900.68	46.7	9.51	3*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**V**)....Δ(**I**, p. 406, **II**)...Hl (**I**, p. 24)....OΣ (**X**)....Cin^5...En (2662)...de Ball (3017)...Glasenapp (**III**)...]

29 58 **11835.** *σ*^{2} *Gruis.* **β 771.** Discovered with the 6-inch at Mt. Hamilton in 1879. The *Cape Catalogue* gives this star a proper motion of 0″096 in the direction of 200°7. The Cordoba magnitude is 6.0. These are all the other measures:

1891.82	259°1	2″22	2*n*	Sellors
1897.04	265.1	2.38	3*n*	See

[β (**XI**)...β^2...β (3114)(*Pub. L. O.* **I, II**)...Sellors (3154)...See (3496)...]

30 8 **11836.** **H 3124.** The only measured position is:

1900.80	270°3	7″27	3*n*	Espin (3717)

30 32 **11839.** **8** *Lacertae.* **Σ 2922.** (= **Ħ IV. 86 = Sh** 348.) Relatively fixed. The principal star is given a proper motion of 0″015 in 198°4 (Auwers).

A and B

1867.20	185°6	22″46	3*n*	Δ
1880.09	185.9	22.30	2*n*	β
1897.87	185.5	22.13	4*n*	Coleman
1902.47	185.0	22.42	1*n*	Hu

B and C

1867.25	154°3	28″13	3*n*	Δ
1880.77	155.0	27.92	2*n*	β
1897.94	154.9	27.89	3*n*	Coleman
1902.47	154.9	28.25	1*n*	Hu

B and D

1867.25	131°3	66″84	3*n*	Δ
1880.09	131.2	66.54	2*n*	β
1897.88	131.2	66.61	5*n*	Coleman
1902.47	131.2	66.87	1*n*	Hu

[Ma (324)...Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Bp...Da^3...Ra (**XXI**)...H (**IV**)...Ba (**II, III**)...Du...Bl (**V**)...Δ (1195)...Δ (**I, II**)...Espin (*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n.* **III**, 228)...Engelhardt (**II**)...β^3...Glasenapp (**II, III**)...*Annals Toulouse Obsy.* **III**...Coleman (*Mem. R. A. S.* **LIV**)...]

(See p. 1085)

30 41 **11840.** **OΣ 474** *rej.* At first thought to be elongated, but not seen since, except Ma has 2°6 (1843.65) 1*n*. Single to Δ in 1865, and Hu with the 36-inch in 1899. Probably not double.

[Ma (**XI, XIII**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

30 42: **11841.** **Ħ V. 96.** "Place by description." Only small stars here, and nothing found likely to be this pair (1876). The vagueness of the description makes it impossible to identify it with certainty.

11842. **β 708.** Discovered with the 18½-inch. *β* 706 is in the field *p*. No change. 30m 42s

1877.55	288°6	8″±	1*n*	β	9.0...11.5
1898.63	288.4	8.56	2*n*	β	8.7...12.0
1901.77	287.7	8.72	3*n*	Doo	8.8...12.0

[β (**X**)...β^1...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **II**)...]

11844. **Ho 186.** Probably fixed. 30 59

1892.41	24°6	7″47	2*n*	Ho
1904.79	27.3	7.07	3*n*	Doo

[Ho (2779, 3558)...]

11845. **H 1791.** Both stars in the *Greenwich 10-year Catalogue.* The larger has a proper motion of 0″152 in 251°6. This appears to be common to both stars, as otherwise the distance in 1828 would have been about 30″. 31 2

1894.2	63°3	17″08		Greenwich
1900.79	60.7	17.72	2*n*	Espin
1905.80	61.1	17.37	2*n*	β

[Espin (3717)...β^6...]

11846. **H 5528.** "Elongated; not fairly divided." The place is that of a 9m star, W^1 XXII. 631, but no sign of duplicity with 6-inch in 1876, nor with the 18½-inch in 1877. Recently examined with the 40-inch with a like result. 31 22

[β^5...]

11847. **Ho 618.** Recent measures give a larger angle. 31 32

1905.80	233°7	6″66	4*n*	Doo	7.4...12.6

[Ho (3558)...]

11848. *κ Aquarii.* **H 5529.** "An exceedingly minute point strongly suspected." I have never been able to see any trace of the small star in the last thirty years. It is practically certain that it does not exist. The proper motion of *κ Aquarii* is given: 31 32

Auwers 0″140 in 219°7

[β (*Mon. Not.* **XXXIV**, 381)...β^6...]

11850. **Σ 2925.** No change. 31 50

1866.13	3°7	6″95	3*n*	Δ
1892.81	4.8	6.34	2*n*	Gla
1902.46	5.0	7.20	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...H^1...H (**V, VII**)...Bp...Da^3...Hd...Δ (**II**)...Ferr...WS...Gl...Se...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

11851. **Ho 294.** The later measures are: 31 56

1894.43	56°8	2″00	3*n*	Ho
1901.88	54.5	2.27	8*n*	Doo

[Ho (*A. J.* 215)(2977, 3234, 3558)...]

32^m 5^s **11853.** **Σ 2926.** (= **S 811.**) Unchanged, but later observers make the distance a little larger.

1867.79	335°2	21″12	4*n*	Δ
1879.43	334.6	21.32	1*n*	Cin
1879.57	335.8	21.10	1*n*	β
1894.70	335.8	21.24	2*n*	Gla
1902.52	335.3	21.44	2*n*	Hu

[Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...β^3...Glasenapp (**III**)...]

32 9 **11854.** **H 3126.** Nothing later but the following:

1877.75	358°6	21″44	1*n*	Cin^4	8.2...10.0

(See p. 1085)

32 10 **11855.** **H 5355.** B is Lalande 44222. C is a reddish star.

AB	1905.53	294°7	76″82	1*n*	β^6	8.0...8.2
AC	1905.53	2.2	106.54	1*n*	β^6	...8.4

32 18 **11856.** **Hn 52.** Later measures make the angle less. The principal star is given a proper motion of 0″052 in 130°4 (*A. G. Harvard*).

1890.61	283°7	4″56	5*n*	Com
1905.88	284.8	4.82	2*n*	β

[β^4...Com (**VI, X**)...β^6...]

32 22 **11858.** **Ho 479.** No other measures.

[Ho (3234)...] (See p. 1085)

32 44 **11860.** **H 1792.** The only measure is:

1900.88	132°8	6″20	2*n*	Espin (3717)

32 47 **11861.** **Ho 480.** Nothing later but the following:

1905.77	227°0	0″84	3*n*	Doo

[Ho (3234)...]

33 3 **11862.** **β 1092.** (AD = **Ḫ V. 94** = **OΣ** (App) **236**; AC = **H 3133.**) The close pair was discovered with the 36-inch. There is an error of 90° in the angle of D as given by Herschel II in his *Fifth Catalogue*. There is also an error of 7^m R. A. and 29′ declination in the place of this star, as given by Herschel I. D is Radcliffe 5779. The recent measures of AB by Aitken show rapid motion, and suggest a short period. The stars are sensibly equal in magnitude, and further measures are needed to adjust the positions given in the proper quadrants.

A and B

1889.30	237°1	0″32	2*n*	β
1899.71	209.5	0.14	1*n*	A
1900.78	96.9	0.1 ±	2*n*	A
1904.60	29.8	0.15	3*n*	A
1905.51	28.7	0.16	2*n*	A

There is very little if any change in the distant stars.

AB and C

1830	272°0	12″ ±	1*n*	H	8.5...13
1889.31	264.0	29.19	3*n*	β	...12.2
1898.71	263.6	30.35	3*n*	A	7.2...12.3
1898.77	263.2	30.07	1*n*	β	7.0...10.8

AB and D

1783.20	135°2	41″67	1*n*	Ḫ	
1830	40.4	30 ±	1*n*	H	... 9.5
1875.13	137.6	42.18	3*n*	Δ	... 7.7
1883.18	137.7	42.19	5*n*	Franz	... 7.6
1889.31	137.4	42.17	3*n*	β	... 7.2
1898.66	137.8	42.42	2*n*	A	... 7.2
1898.77	137.0	41.97	1*n*	β	... 8.0

[β (**XV**)...β (2929)(*Pub. L. O.* **II**)...Franz (2650)...Δ (**I**)...A (3639)(*Bul. L. O.* No. 11)...]

11863. **Ḫ N. 117.** (AB = **Ḫ VI. 119** : BC = **H 5356.**) 33^m 5^s Measures from H^3. Wide pair unchanged, but distance of BC may be diminishing.

A and B

1881.83	160°2	86″62	3*n*	β	7.2...8.0
1892.86	159.4	86.52	2*n*	Gla	5.5...6.4
1903.67	159.8	86.40	2*n*	β	

B and C

1857.90	57°9	3″45	2*n*	J	
1877.42	60.2	3.39	6*n*	Cin	
1881.83	59.7	2.94	3*n*	β	8.0...8.5
1896.81	61.0	2.85	1*n*	Cogshall	
1897.26	60.9	3.31	6*n*	See	7.7...8.8
1903.67	64.0	3.01	2*n*	β	8.2...8.7
1903.74	63.0	3.10	2*n*	Scott	

[J^2...J^3... Dun...H^3...Cin^3...Cin^4...Cin^5...β^3 (p. 326)... Do (3546) proper motion...Glasenapp (**II**)...Scott (*Brit. Ast. Ass'n.* **V**, 75; **VI**, 250)(*Mon. Not.* **LXIV**, 52)....See (3496)....Lunt (*Annals Cape Obsy.* **II**)(*Mon. Not.* **LXI**, 611)...]

11866. **Σ 2928.** (= **S 812.**) This seems to be a system of 33 10 the 61 *Cygni* type, the components having slightly different proper motions. The movement of the following star A is given from meridian observations:

Stumpe	0″291 in 118°7	
Porter	0.268 in 122.8	
Paris	0.275 in 125.0	

1830.82	327°7	4″70	3*n*	Σ
1857.40	322.0	4.39	2*n*	Se
1864.15	319.3	4.37	5*n*	Δ
1879.83	315.8	4.27	4*n*	Cin
1887.28	315.3	4.22	6*n*	Hl
1892.82	315.8	4.17	5*n*	Jones
1897.76	313.1	4.16	4*n*	Doo
1902.61	312.0	4.12	2*n*	Hu

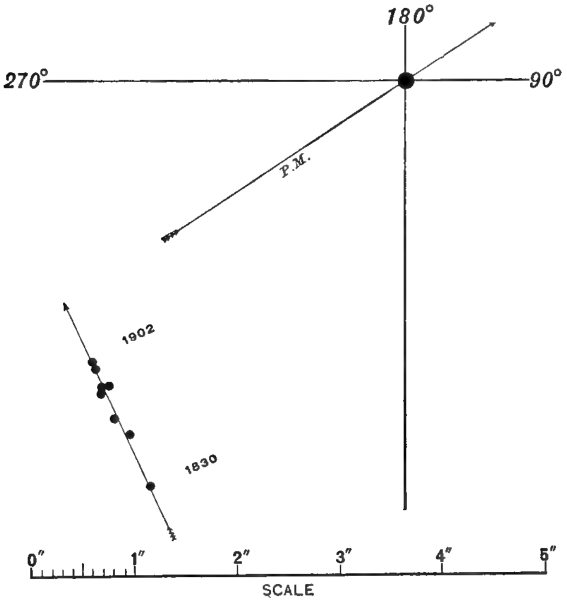
The eight measures of the companion give for the apparent movement of A:

0″0178 in 24°1

Taking the mean of the last two values from meridian observations, we have for the proper motion of the components:

A = 0″272 in 123°9
B = 0.275 in 127.5

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Mh...Se...Bp, p. 166...Ferr...Δ (1195, 1475)....Δ (**I, II**)....Ra (**XXIII, XXXVI**)....Gl....WS^2....Sk....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2199, 3378)...Flm...Pt...Cin^4...Cin^5...Cin^6...



Σ 2928.

Wilson (Cin^{10})...LM...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Collins (*A. J.* 378)...Solá (3497)...Lunt (*Mon. Not.* **LXI**, 611)....Doolittle (*Pub. Flower Obsy.* **I**)....*Annals Toulouse Obsy.* **III**...Sk^5...Scott (*Mon. Not.* **LXIV**, 52)...]

33m 17s **11868.** **A. G. 284.** Double in *A. G. Lund.* Measures by β^6.

33 18 **11869.** **H 1795.** "A, B and C in a line. Query if a fourth."

33 20 **11870.** **Σ 2929.** No change.

1867.11	356°2	1″72	3*n*	Δ
1902.61	358.8	1.95	2*n*	Hu
1904.92	361.2	1.36	1*n*	Furner

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...UL...Glasenapp (**II**)...Furner (*Mon. Not.* **LXVI**, 32)...]

33 26 **11872.** **Σ 2930.** No change.

1865.45	77°2	21″40	3*n*	Δ
1892.85	77.0	21.33	2*n*	Gla
1902.61	76.4	21.67	2*n*	Hu

[H (**V**)...Ma (*F. S.* **II**)...Δ (**II**)...Cin^5...Glasenapp (**II**)...*A. G. Leipzig*, p. 251...*Annals Toulouse Obsy.* **III**...]

11873. **Ho 295.** Probably unchanged. All the other measures are given. 33m 39s

1895.70	334°7	0″25	1*n*	Ho
1900.93	337.2	0.28	3*n*	A
1902.74	327.7	0.32	1*n*	Doo

The proper motion of this star (Groombridge 3843) is 0″248 in 77°0 (*Greenwich*).

[Ho (2977, 3558)....A (*Bul. L. O.* No. 11)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11874. **H 3128.** "Very fine." Probably fixed. 33 34

1877.70	226°2	10″70	1*n*	β	
1877.81	224.8	10.78	2*n*	Cin	7.0...10.0

[β^1...Cin^4...] (See p. 1085)

11875. **OΣ 475.** Fixed. 33 39

1866.07	73°4	15″49	3*n*	Δ
1898.94	72.8	15.78	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Δ (**I**)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

11877. 10 *Lacertae.* **S 813.** (= H V. 97 = σ 760.) Without change. The proper motion is 0″013 in 90° (Auwers) These are all the later measures: 33 52

1854.80	48°6	60″89	2*n*	OΣ	5.5... 9.0
1902.54	49.0	61.51	2*n*	β	...10.1
1904.64	48.6	61.23	2*n*	Espin	... 9.6

[OΣ (**X**)...β^6...Espin (*Mon. Not.* **LXVI**, 144)...]

11878. **H 1796.** Recent measures give: 33 54

1902.83	6°6	29″57	1*n*	Espin	
1905.93	15.4	29.49	2*n*	β	...10.8

[Espin (*Mon. Not.* **LXIV**, 679)...β^6...] (See p. 1085)

11879. **Hu 779.** With another measure the mean is: 33 57

1904.52	151°8	0″77	3*n*	Hu	8.8...12.0

[Hu (*Bul. L. O.* No. 65)...]

11881. **H 968.** Double in *A. G. Lund.* 34 3

1902.60	111°2	4″22	2*n*	β^6	8.6...9.0
1904.74	109.1	4.42	3*n*	Espin	8.3...8.8

[Espin (*Mon. Not.* **LXVI**, 143)...]

11883. **H 3129.** There is no pair in this place. Certainly an error in H of 2m R. A., making it identical with H 3135. (No. 11911.) 34 5

11884. **Ho 187.** Fixed. 34 6

1894.77	287°7	18″16	2*n*	Ho	
1905.75	287.3	18.75	4*n*	Doo	6.1...10.2

[Ho (2779, 3558)...]

34^m 9^s **11887.** **Hu 778.** With two additional measures (*Bul. L. O.* No. 65) the mean is:

1904.56	44°.1	0″.41	4*n*	Hu	9.1...9.6

34 14 **11888.** **β 277.** Discovered with the 6-inch. A faint star about 30″ distant. It is the *p* star of a wide pair. The angle seems to be increasing.

1879.46	199°.3	0″.59	1*n*	β
1886.78	200.2	0.6±	1*n*	Young
1893.54	201.9	0.49	1*n*	Lv
1893.65	204.6	0.58	3*n*	Wilson
1903.68	210.7	0.55	3*n*	Doo

[**β (V)**...**β** (*Mon. Not.* **XXXV**, 31)...β^3...Δ (I)...Perry (*Eng. Mech.* **XXXVI**, 65) ...Lv (*A. J.* 382)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

34 33 **11891.** **A. G. 285.** Double in *A. G. Leiden.* Measures by β^6. There is a similar pair 23^s *p* and 2′ 52″ *s*:

1902.62	173°.0	32″.27	2*n*	β^6	8.9...10.4

34 46 **11893.** **Ho 188.** The angle may be increasing.

1894.79	45°.1	0″.38	1*n*	Ho
1904.79	49.4	0.50	4*n*	Doo
1905.81	53.0	0.45	3*n*	Doo

[**Ho** (2779, 3558)...**Doolittle** (*Pub. Flower Obsy.* **II**)...]

34 56 **11895.** **Ho 296.** This star has a large proper motion:

Porter	0″.290	in	65°.3
Glasgow	0.304	in	60.5
Paris	0.288	in	64.5

Probably no change, but the observations are very discordant. These are all the measures:

1902.08	91°.0	0″.27	4*n*	Lewis
1902.48	73.1	0.32	6*n*	Bryant
1903.49	69.7	0.40	6*n*	Bowyer
1903.77	73.1	0.33	2*n*	Doolittle

[Ho (2977, 3558)....Greenwich Obsy. (*Mon. Not.* **LX**, 515; **LXI**, 486; **LXIII**, 403; **LXIV**, 806)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

35 6 **11897.** **Σ 3134.** Unchanged.

1869.80	77°.2	6″.18	5*n*	Δ
1893.98	76.8	6.21	3*n*	Gla
1905.93	76.5	6.25	1*n*	β

[**Wr**...**Se**...**Du**...Δ (**II**)...**Glasenapp** (**III**)...*Annals Toulouse Obsy.* **III**...β^6...]

35 18 **11899.** **β 480.** Discovered with the 6-inch. No change.

1891.56	63°.5	0″.80	3*n*	β
1900.56	65.1	0.92	3*n*	Doo

[**β (IX)**...**β** (*Mon. Not.* **XXXVIII**, 78)...**β** (3114)(*Pub. L. O.* **II**)...Δ (**I**)...**Doolittle** (*Pub. Flower Obsy.* **I**)...]

11900. **β 1265.** Discovered with the 36-inch. So far without sensible change. All the later measures are given. 35^m 18^s

B and C

1899.02	250°.6	0″.56	3*n*	A	9.6... 9.7
1900.51	245.9	0.54	2*n*	Doo	10.0...10.0

A and BC

1898.79	346°.7	39″.76	3*n*	A	9.0...

[β (**XVIII**)....β (3113)(*Pub. L. O.* **II**)....A (3639)....Doolittle (*Pub. Flower Obsy.* **I**)...]

11901. **Hu 780.** With two other measures the mean is: 35 18

1904.57	1°.2	0″.29	3*n*	Hu	9.2...9.4

[Hu (*Bul. L. O.* No. 65)...]

11902. **Σ 2931.** No change. 35 21

1867.77	147°.1	4″.51	4*n*	Δ
1905.50	147.5	4.43	2*n*	β

There is a distant star not previously measured:

AC	1905.64	0°.7	29″.77	1*n*	β	...13

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)... Se... Δ (**II**)...Glasenapp (**II**)... *A. G. Leipzig,* p. 211...β^6...]

11903. **β 709.** Discovered with the 18½-inch. Apparently unchanged. 35 26

1886.79	6°.0	2″.13	2*n*	LM
1896.81	5.4	2.04	3*n*	Lv
1898.64	6.0	1.99	3*n*	Cogshall
1901.67	9.3	2.15	4*n*	Doo

[β (X)...β^1...LM...Lv^1... Lv (*A. J.* 407)...Glasenapp (**III**)...Cogshall (*A. J.* 478)...Innes (*Mon. Not.* **LXI**, 416)...Doolittle (*Pub. Flower Obsy.* **II**)...]

11905. ζ *Pegasi.* The proper motion is 0″.067 in 105°.5 (Auwers). The only other position of B is: 35 38

1900.53	139°.0	63″.58	2*n*	β	...12.0

[β^3...β^5...]

11906. **Σ 2932.** (= **S 814.** AC = **H 1798.**) The third star from H (IV); not in Σ. The distance of AB may be increasing. 35 50

A and B

1866.88	281°.0	19″.43	3*n*	Δ
1902.62	280.7	20.25	2*n*	Hu
1905.93	280.5	20.58	1*n*	β

A and C

1905.93	12°.3	29″.77	1*n*	β	...11.0

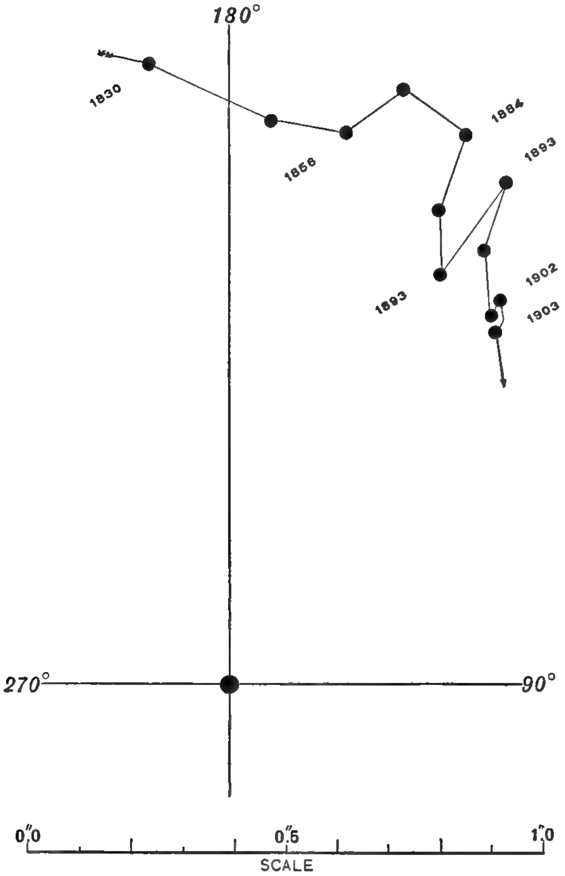
[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Glasenapp (**III**)...β^6...]

11907. **H N. 140.** The place in H is erroneous. Nothing of Class II found (1877). The only measure is: 35 51

1901.64	262°.3	75″.27	2*n*	β^5	6.5...9.1

36^m 3^s **11908.** **Σ 2934.** Slow retrograde motion, with a little decrease in the distance, and probably a binary of long period. The proper motion of the system is 0″081 in 149°0 (*A. G. Berlin*).

1830.78	187°8	1″22	3*n*	Σ
1843.77	176.0	1.10	1*n*	Ma
1856.87	168.2	1.10	2*n*	Se
1864.02	163.7	1.21	4*n*	Δ
1884.21	156.9	1.17	6*n*	En
1887.94	156.2	1.01	3*n*	Hl
1893.25	152.8	0.90	6*n*	Com
1893.66	151.1	1.12	1*n*	Gla
1895.85	149.5	0.98	2*n*	Collins
1899.67	144.4	0.88	4*n*	Bowyer
1902.82	144.7	0.94	2*n*	Do
1903.83	142.8	0.86	2*n*	Lewis



Σ 2934

[Ma (*F. S.* **I**)....Ma (**X, XI, XV**)....Se....Ferr....Δ (1475)....Δ (**II**)....Flm.... Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Do (2303, 3023, 3931)....WS.... WS²...Gl...Sk...Big...de Ball (2753)...En (2742)...Hl (**II**)...Glasenapp (**III**) ...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 515; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Collins (*A. J.* 378)...Com (**X**)... HΣ (**XII**)... Sk⁵...]

36 4 **11909.** **Hu 781.** With other measures the mean is:

1904.57 1°2 0″29 3*n* Hu 9.2...9.4

[Hu (*Bul. L. O.* No. 65)...]

11910. 12 *Lacertae.* **S 815.** (= σ 761 = **H VI. 121.**) 36^m 6^s
The proper motion of the principal star is given 0″023 in 82°6 (Auwers.)

1881.42	15°9	70″50	3*n*	β	5.7... 9.7
1903.40	15.2	69.80	3*n*	β	...10.1

These positions give for the proper motion of A, 0″050 in 66°3.

[Espin (*Brit. Ast. Ass'n.* **III**, 229)(*Mon. Not.* **LXVI**, 144)...β⁴...β⁶...]

11911. **H 3135.** (= **H 3129.**) Error of 2ᵐ R. A. in H 3129 (No. 11883.) The only measure is: 36 7

1903.10 358°6 34″30 2*n* β⁶ 8.4...11.0

11912. **β 845.** Discovered with the 15½-inch at the Washburn Observatory. No change. 36 27

A and B

1888.06	197°1	6″13	3*n*	Com
1892.92	195.3	6.02	1*n*	W
1903.70	194.6	6.18	3*n*	Doo

A and C

1887.79	11°9	15″38	3*n*	Com
1892.92	12.0	15.39	1*n*	W
1903.68	11.7	15.35	2*n*	Doo

[β (**XII**)...β⁴...Com (**VI**)...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **II**)...]

11913. **A 310.** No other measures. 36 41

[A (3784)(*Bul. L. O.* No. 16)...]

11914. **Σ 2935.** (= **H I. 50** = **H N. 128, 133** = **Sh 349.**) 36 46
Fixed.

1866.08	311°2	2″59	3*n*	Δ
1890.81	312.3	2.57	5*n*	T
1902.61	311.1	2.62	2*n*	Hu

There is a small proper motion, 0″038 in 34°5 (Hedrick).

[Ma (*F. S.* **I**)...Ma (**X**)...H (**VII**)...Se...Se³...Mh...J²...Ra (**XXI**)...Du... Δ (1195)...Δ (**I, II**)...Cin⁴...LM...T (2899, 3185)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Solá (3497)...*Annals Toulouse Obsy.* **III** ...Do (3799)...]

11915. **Σ 2933** *rej.* This place agrees substantially with that given in *Catalogus Novus.* No other pair near. Magnitudes not given by Struve. The only measure is recent: 36 49

1901.58 216°8 4″26 2*n* β⁵ 9.2...10.4

11916. **Σ 2936.** *Aquarii* 215. Without change. A 15″ pair, 9...13, given in this place in *Harvard Zones.* There is nothing here except the Σ pair (1876.) 36 50

1866.41	50°3	4″75	3*n*	Δ
1877.83	50.8	4.92	1*n*	β
1893.69	48.2	4.69	2*n*	Gla
1902.61	47.8	4.94	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....H (**V**)....Δ (**II**)....β¹....Cin⁵....Glasenapp (**III**)...]

$36^{m}\ 57^{s}$ **11917. β 710.** Discovered with the 18½-inch. There is a little change in the angle. It is about 30′ *s* of *η Pegasi.*

1889.89	232°.5	0″.4±	9*n*	Sp
1891.76	235.3	0.39	2*n*	β
1897.91	235.1	0.41	5*n*	Lewis
1898.64	235.3	0.32	3*n*	A
1901.17	234.4	0.42	5*n*	Lewis
1901.80	241.0	0.42	3*n*	Doo
1904.59	238.1	0.40	2*n*	A

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)... Sp (**III**)... A (3585)...Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 515; **LXI**, 486; **LXIII**, 403).... Doolittle (*A. J.* 547) (*Pub. Flower Obsy.* **II**)...]

37 0 **11918. A 188.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

37 5 **11920. β 176.** Discovered with the 6-inch. Σ 2942 is $1^{m}\ 35^{s}$ *f* and 10′ *n*. Apparently fixed.

1877.78	42°.0	2″.50	1*n*	β	8.7...9.0
1883.69	49.3	1.84	5*n*	En	8.9...9.9
1892.73	41.9	2.21	1*n*	Wilson	9.0...9.3
1899.13	43.2	2.26	4*n*	Doo	8.8...9.1

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β^1...Δ (**I**)...En (2678)...Wilson ( )... Doolittle (*Pub. Flower Obsy.* **I**)...]

37 5 **11921. Hu 395.** (AC = **H** 1800 = **H** 3136.) The principal star of the Herschel pair was found to be a close double by Hussey with the 36-inch in 1901. The only other observations of C are:

1830	253°.0	15″±	1*n*	H	9.10...11
1901.68	64.8	11.28	1*n*	Hu	

According to Hussey's measure of the Herschel star, the close pair should be the *p* star, and therefore the smaller star as rated by H.

[Hu (*Bul. L. O.* No. 12)...]

37 6 **11922. Hu 289.** Previously noted as double by Skinner with the Washington Meridian Circle.

1901.53	282°.4	1″.67	1*n*	β	8.5...8.6

[Boeger (*A. J.* 522)...Hu (*A. J.* 494)...β^6...]

37 23 **11924.** ***η Pegasi.*** **β 1144.** (AB = **S** 816 = ℌ **VI. 21** = σ 763.) The close pair was discovered with the 36-inch. The measures show no change. The wide pair was first noted by ℌ, but not measured. The only measures preceeding my own are those of South in 1824. The principal star has a proper motion of 0″.038 in the direction of 183°.9 (Auwers.)

All the measures of the close pair are given.

B and C

1889.53	83°.3	0″.29	4*n*	β
1890.23	63.9	0.3±	12*n*	Sp
1892.13	62.0	0.3±	4*n*	Sp
1893.73	77.3	0.3±	1*n*	Wilson
1894.06	82.3	0.33	9*n*	Barnard
1898.63	81.6	0.28	4*n*	A
1899.57	88.2	0.32	7*n*	Lewis
1899.91	81.1	0.36	1*n*	Bowyer

A and BC (= ℌ VI. 21 = S 816)

1824.85	338°.9	89″.82	2*n*	S
1893.73	339.0	90.25	1*n*	Wilson
1897.76	339.1	90.42	2*n*	Barnard
1898.60	338.6	91.04	2*n*	A

η Pegasi was found to be a spectroscopic binary by Campbell at the Lick Observatory (Astrophysical Jour. VIII. pp. 159, 293).

[β (**XVI**)...β (2956)(*Pub L. O.* **II**)...Sp (**III**)...Wilson ( )...Barnard (*A. J.* 447) ...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXI**, 486; **LXIII**, 403)...A (3585)...]

11925. H 1801. Third star not seen on one occasion with the 6-inch (1876.) The only measures are: $37^{m}\ 34^{s}$

AB	1905.55	344°.3	18″.77	2*n*	β^6	9.4...13.1
AC	1905.55	295.5	29.80	2*n*	β^6	... 9.5

11928. Hu 91. (AB = **OΣ 476.**) The smaller component of OΣ 476 was found to be a very close pair by Hussey with the 36-inch in 1898. These three stars make the closest triple system known. No other measures of BC. 37 54

There is very little if any change of the close pair with reference to A.

A and BC

1876.70	327°.6	0″.66	2*n*	Δ
1881.84	330.4	0.51	1*n*	Big
1894.99	328.2	0.57	1*n*	Big
1898.64	327.8	0.54	3*n*	Hu

The proper motion of this star (Groombridge 3864) is 0″.032 in 122°.4 (*Greenwich*).

[Ma (**XI**)...Da^3...OΣ (**IX**)...Δ (**I**)...WS^2...Flm...Do (2330)...Bl (**V**)...Big... Big (*Bul. Ast.* **XII**, 299)...Glasenapp (**III**)...Hu (*A. J.* 480)(*Pub. L. O.* **V**)...]

11929. Σ 2940. Fixed. 38 2

1868.96	140°.5	2″.64	4*n*	Δ
1879.75	138.8	2.78	1*n*	Cin
1905.48	140.9	2.71	1*n*	Lau

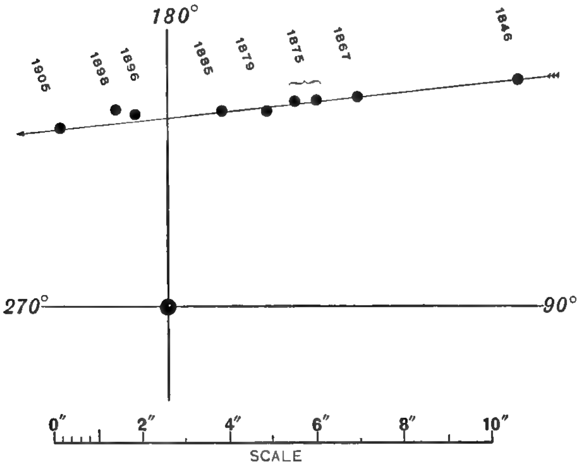
[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV, V**)...Δ (**II**)...Cin^6...Lau (4078)...]

11930. OΣ 477. The change is entirely due to the proper motion of the principal star (Groombridge 3866.) This motion is: 38 16

Greenwich	0″.181 in 94°.1
Measures of B	0.180 in 94.8

The last is the most probable value from the following measures of the small star:

1846.06	122°.7	9″.60	3*n*	OΣ
1867.06	137.6	6.48	3*n*	Δ
1875.18	144.0	5.82	2*n*	Δ
1875.74	148.2	5.54	2*n*	OΣ
1879.74	153.0	5.01	2*n*	Hl
1885.76	164.6	4.63	3*n*	Hl
1896.74	190.4	4.45	3*n*	Lv
1898.32	195.1	4.63	5*n*	Hu
1905.46	211.7	4.96	3*n*	β



OΣ 477.

[OΣ (**IX**)...Δ (I)...Bl (**V**)...Big...Flm...β1...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Com (**X**)...Lv (*A. J.* 407)...Hu (*A. J.* 427)(*Pub. L. O.* **V**)...β6...]

$38^{m}\ 34^{s}$ **11931.** **H** 5359. (= Σ 2937 *rej.*) The only measures are:

AB	1902.62	65°.2	20″.47	2*n*	Hu
AC	1902.62	345.9	16.83	2*n*	Hu

38 37 **11933.** **H** 3139. The only measure is:

1900.73 215°.1 2″.48 2*n* β5 13...13

The pair measured is in the correct place substantially, but the description does not agree. In the field is a triangle of 11m stars, the side of which is about 23″. The *f* star of this triangle is 98°.3 : 33″.1 from A of the double.

38 37 **11934.** See 476. A later position is:

1899.18 40°.5 4″.58 1*n* Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...]

38 40 **11936.** Σ 2942. (= **H** 1802 = OΣ 478; AC = β 450.) The small star was noted with the 18½-inch. There is no sensible change in the Σ companion. The principal star has a proper motion of 0″.027 in 235°.9 (Battermann.)

A and B

1869.52	280°.3	2″.83	6*n*	Δ
1878.97	280.2	2.68	2*n*	β
1883.21	282.0	3.04	6*n*	En
1895.91	277.1	2.85	2*n*	Maw
1898.70	279.8	3.00	4*n*	Hu

A and C

1893.53	231°.8	10″.86	1*n*	Lv
1899.20	235.0	10.74	2*n*	Hu

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)...β1...β3...Lv (*A. J.* 382)...Ma (**XI**)...Da3...Ba (I)...OΣ (**IX**)...Δ (**II**)...Δ (1736, 1979)...WS...Big...En (2678)...Glasenapp (**III**)...Maw (*Mem. R. A. S.* **LIII**)...Do (3931)...Hu (*Pub. L. O.* **V**)...]

11938. 13 *Lacertae.* OΣ 479. (= **H** N. 42 = **H** 1803.) $38^{m}\ 44^{s}$
There is no sensible change. The proper motion of the principal star is small and somewhat uncertain:

Auwers	0″.035 in 290°.1
Newcomb	0.016 in 306.9

1867.82	129°.4	14″.76	4*n*	Δ
1880.09	130.0	14.11	2*n*	β
1898.68	129.3	14.83	3*n*	Hu

[OΣ (**IX**)...Δ (I)...β3...Hu (*Pub. L. O.* **V**)...]

11939. Σ 2938. Unchanged. 38 53

1866.34	162°.2	19″.56	3*n*	Δ
1892.85	162.6	19.17	2*n*	Gla
1902.62	162.2	19.82	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII**)...H1...H2...H (**VII**)...Se1...Bp...Ra (**XXIII**)...Δ (**II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

11940. Σ 2939. (= **H** III. 69.) Fixed. 39 3

1866.43	62°.5	10″.80	3*n*	Δ
1893.71	61.6	11.12	2*n*	Gla
1902.62	61.2	11.21	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)...OΣ (**IX**)...Wr...Δ (**II**)...T (2899, 3185)...Glasenapp (**III**)...]

11941. **A. G.** 286. Noted "obl.?" in *A. G. Berlin.* 39 5
Miller (*A. J.* 546) found it single in 1902.

11942. **Hu** 92. (AB = **H** 1807). Herschel's companion 39 29
was found to be a close pair by Hu. The principal star has a proper motion of 0″.089 in 252°.3 (Schroeter).

1899.37 188°.2 23″.69 3*n* Hu 8.5...9.5

[Hu (*A. J.* 480)(*Bul. L. O.* No. 44)...]

11943. β 711. Discovered with the 18½-inch. There is 39 29
considerable angular motion for a pair of stars of this magnitude. The magnitude in DM is 9.1. It is 27^{s} *p* a 7m star. The following are all the measures:

1878.59	79°.9	0″.72	1*n*	β
1891.88	55.3	0.83	3*n*	β
1893.70	53.4	1.24	1*n*	W
1897.83	46.6	0.96	1*n*	Brown
1898.74	47.6	0.99	3*n*	A
1898.79	47.0	0.82	3*n*	Bowyer
1899.78	44.5	1.07	1*n*	Bryant
1901.12	45.2	0.88	3*n*	Lewis
1902.27	44.0	0.95	6*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...Wilson ( )...A (3585)...Brown (3646) Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXI**, 486; **LXIII**, 403)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

$39^m\ 49^s$ **11946.** **H 1806.** The measures show no change.

1875.94	337°.8	7″.08	4*n*	Δ (I)	8.5...9.2
1903.52	337.1	7.24	2*n*	β^6	9.1...9.6

39 51 **11947.** **A. G. 287.** Double in *A. G. Lund.* Measures by β^6.

39 58 **11949.** **Hu 782.** No other measures.

[Hu (*Bul. L. O.* No. 65)...]

40 3 **11951.** **Ho 481.** No other measure.

[Ho (*A. J.* 215)(3234)...]

(See p. 1085)

40 7 **11952.** **Σ 2941.** The measures in Ma (XV) evidently belong to Σ 2944. The change is due to the proper motion of A, 0″.036 in 69°.

1830.07	270°.5	8″.73	3*n*	Σ
1843.70	269.5	9.27	1*n*	Ma
1853.03	267.6	9.40	1*n*	Ma
1866.28	266.9	9.76	6*n*	Δ
1887.84	264.6	10.90	2*n*	Hl
1890.39	265.4	10.67	4*n*	HΣ
1893.67	265.1	10.56	2*n*	Gla
1902.85	265.3	11.21	3*n*	Do

[Ma (*F. S.* **I**, **II**)... Ma (**XI**, **XIII**, **XV**)... Flm... Δ (1573)... Δ (**II**)... Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**)...Hl (**II**)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...]

40 19 **11953.** **Hu 783.** No other measures.

[Hu (*Bul. L. O.* No. 65)...]

40 24: **11954.** **H V. 94.** "Place by description." There is a large error in the place of H. This is AD of β 1092 (No. 11862).

40 24 **11955.** **H 969.** The only later observation is:

1904.78	24°.8	5″.98	3*n*	Espin

[Espin (*Mon. Not.* **LXVI**, 143)...]

11957. ξ *Pegasi.* **H 301.** Angle and distance from H (V). $40^m\ 42^s$ The principal star has a considerable proper motion:

Stumpe	0″.511 in 158°.7
Auwers	0.514 in 158.9
Porter	0.541 in 158.9
Paris	0.528 in 157.2

The companion has the same movement, and the two probably form a physical system.

1866.79	117°.7	12″.17	2*n*	Δ	4.0...12.0
1879.38	112.6	11.93	4*n*	β	...12.4
1896.70	110.5	12.30	2*n*	Lv	
1899.39	109.6	12.32	6*n*	β	...12.2

[H (**V**)... Δ (**I**)...Pk...Sadler (*Ast. Reg.* **XXIII**, 117)...β^1...β^3...Lv (*A. J.* 407)... HΣ (**XII**)...β^5...]

11958. **Hu 784.** With another measure (*Bul. L. O.* No. 40 48 65) the mean is:

1904.52	273°.9	2″.35	2*n*	Hu	9.0...12.2

11961. **Ho 619.** No change. 41 2

1905.75	7°.4	18″.57	4*n*	Doo	7.4...12.6

[Ho (3558)...]

11962. **OΣ 529.** Without change. The measures by 41 3 Hu (*Pub. L. O.* V) credited to OΣ 530, belong to OΣ 529.

A and B

1870.39	204°.8	3″.44	3*n*	Δ
1889.81	202.5	3.47	1*n*	HΣ
1899.20	202.5	3.60	7*n*	Hu

A and C

1870.39	220°.6	20″.59	3*n*	Δ
1899.35	219.5	20.75	3*n*	Hu

[OΣ (**IX**)... Δ (**I**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

11964. **H 1808.** The only recent measure is: 41 13

1901.76	317°.4	10″.06	1*n*	Es	9.5...9.6

[Espin (*Mon. Not.* **LXIV**, 679)...]

11965. **Ho 189.** No later measures. 41 13

[Ho (2779)...]

(See p. 1085)

11966. **OΣ 480.** (= **H 1809.**) Without change. B is 41 19 Rad^1 5828.

1867.24	117°.2	30″.96	3*n*	Δ
1898.59	116.9	30.91	3*n*	Hu
1902.07	117.0	30.80	3*n*	β

The proper motion of this star, Groombridge 3885, is 0″.063 in 180°.7 (Greenwich).

[Ma (**XI**)....OΣ (**IX**)....Δ (**I**)....Glasenapp (**IV**,**V**)....Hu (*Pub. L. O.* **V**)....β^5.... β^6...]

41^m 20^s **11967.** τ^1 *Aquarii.* **Σ** 2943. (= **H̥** V. 80 = **S** 817.) The proper motion of the principal star is given from meridian observations:

Auwers	0″.019 in 180°
Hedrick	0.037 in 111.8

The observations of the companion star show that the motion of A is almost wholly in R. A.

0″.065 in 87°.7

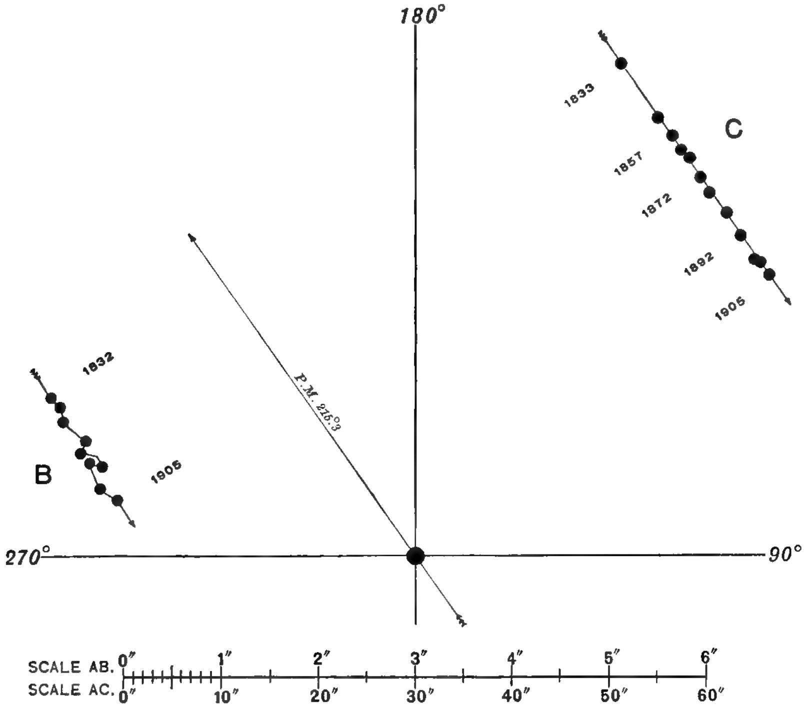
1783.60	109°.9	35″.64	2*n*	H̥
1831.81	112.2	30.70	3*n*	Σ
1864.48	114.6	28.49	6*n*	Δ
1888.86	115.4	27.32	3*n*	Hl
1905.55	116.8	26.33	3*n*	β

The measures of Σ, Δ, Hl and β (1831–1905) give the proper motion:

0″.065 in 87°.7

[Ma (*F. S.* **II**)...H (**V, VIII**)...Da^1...D^2...J^2...Ra (**XXI**)...Flm...Δ (1475)... Δ (**II**)...Pt...Cin^4...Do (3378)...*Annals Toulouse Obsy.* **III**...β^6...]

41 40 **11968.** **Σ** 2944. (= **H̥** II. 57 = **Sh** 350.) The principal star, A, has a large proper motion. This is given from meridian positions:



Σ 2944.

Stumpe	0″.351 in 220°.0
Porter	0.362 in 215.3
Paris	0.358 in 215.6

The nearest star, B, is moving in the same direction, but the annual movement is 0″.016 less than the other. They form a system of the 61 *Cygni* type.

A and B

1832.98	246°.9	4″.12	8*n*	Σ
1844.99	247.8	4.00	3*n*	Ma
1855.84	249.5	3.91	2*n*	Se
1867.13	251.4	3.61	7*n*	Δ
1879.76	253.2	3.62	2*n*	Hl
1885.74	255.5	3.38	2*n*	Hl
1892.76	255.5	3.50	3*n*	Maw
1902.62	258.3	3.34	2*n*	Hu
1905.53	259.8	3.15	2*n*	β

The above measures give the apparent motion of B with reference to A:

0″.0164 in 31°.6

A and C

1833.01	157°.3	55″.64	7*n*	Σ
1851.90	150.9	52.12	2*n*	OΣ
1857.90	148.4	51.33	4*n*	Δ
1862.68	146.7	50.61	3*n*	Δ
1867.54	145.2	50.28	1*n*	Δ
1872.56	142.8	49.23	1*n*	Δ
1877.87	140.8	48.65	1*n*	β
1883.74	137.5	48.24	2*n*	Hl
1892.75	134.3	47.66	2*n*	Maw
1898.82	130.8	46.95	4*n*	Coleman
1902.62	130.1	47.11	2*n*	Hu
1905.53	128.1	47.02	3*n*	β

These measures give for the most probable proper motion of A:

0″.375 in 214°.7

[Ma (*F. S.* **I**)... Ma (**X, XI, XV**)... *Pos. Med.* p. **CCXXXIII** ... H (**VIII**)...Se... Se^2...Se^3...Se (1017)...Bp...Wr...Ba (**II, III, IV**)...Ra (**XXI**)...Hd...Flm ....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)....Do (2199, 3799)....Giacomelli (**III**)....Nobile (*Rend. della R. Accad. Sci.*, Napoli, 1875)....OΣ (**IX, X**).... Δ (1195, 1475)...Δ (**I, II**)...Pl...Pt...Du (pp. **XXVIII**, 139)...WS...WS^2 .. Gl...Sk...Cin^3.. Cin^4...Wilson (Cin^{10})...Lv^1...LM...Sp (**II**)...Hl (*Wash. Obsns.* 1885)... Hl (**I, II**)...β^1... Je (2307)... Engelhardt (**II**)... Maw (**II**)... T (2899, 3185)... Jones (*Proc. Haverford Coll. Obsy.* 1892)... Glasenapp (**II**) ...Solá (3497)...Knorre (3518)...Bryant (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXII**, 383)...*Annals Toulouse Obsy.* **III**...Lewis (*Observatory* **XXV**, 402)...Thiele (3837)...Sk^5 ... Scott (*Mon. Not.* **LXIV**, 52)...Coleman (*Mem. R. A. S.* **LIV**) ...β^6...]

11969. **A** 189. Aitken mentions a 14.5 m star, 127°:24″. 41^m 43^s

1903.52	204°.7	0″.87	2*n*	β

[A (3741)(*Bul. L. O.* No. 3)...Lau (*Bul. Ast.* **XXII**, 238)...β^6...]

11970. **OΣ** 481. Unchanged. 41 55

1876.93	268°.3	2″.28	13*n*	Δ
1878.48	269.8	2.37	10*n*	Hl
1889.01	266.6	2.47	12*n*	Com
1897.86	268.3	2.24	3*n*	Doo
1898.69	268.3	2.39	3*n*	Hu
1905.81	267.3	2.15	1*n*	β

[OΣ (**IX, X**)...Δ (**I**, pp. 212, 399)...Big...Pt...En (2662)...Com (**VI, X**)...Cin^5... Hl (**I**, p. **24**)....de Ball (3017)....Hu (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

11971. **β** 1037. Discovered with the 36-inch. The *p* star of a wide pair. These are all the measures: 41 56

1888.81	224°.4	0″.66	4*n*	β
1899.10	215.0	0.74	2*n*	A
1899.85	232.3	0.69	1*n*	Lewis

[β (**XIV**)... β (2875)(*Pub. L. O.* **II**)... A (3639)...Lewis (*Mon. Not.* **LX**, 515)...]

42^m 7^s **11973. Ho 297.** No change.

1894.77	140°.7	6″.71	1*n*	Ho
1904.76	140.4	6.68	3*n*	Doo

[Ho (2977, 3558)...]

42 22 **11975. H 1810.** "The chief of a cluster."

1902.73	355°.2	20″.79	2*n*	β^6	8.5...10.4

42 45 **11977. β 1145.** Discovered with the 36-inch.

A and B

1898.88	156°.3	1″.06	2*n*	A

A and C

1898.82	179°.7	22″.27	3*n*	A	...10.0

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...]

42 46 **11978. Innes 141.** Discovered by Innes.

1901.80	322°.3	2″.81	3*n*	Doo	9.2...9.8

[Innes (3406)(*Mon. Not.* **LXII**, 533).... See (3496).... Doolittle (*Pub. Flower Obsy.* **II**)...]

42 49 **11979. β 1146.** Discovered with the 36-inch. Change in angle and distance is probable. The following are all the measures:

1889.55	335°.3	0″.23	3*n*	β
1897.80	331.1	0.19	1*n*	Lewis
1899.56	313.6	0.18	4*n*	A
1899.85	(232.3)	(0.69)	1*n*	Lewis
1900.66	324.9	0.18	3*n*	A
1902.92	295.6	....	1*n*	Lewis
1903.66	305.0	0.13	1*n*	A
1904.73	310.2	0.15	2*n*	A
1905.56	309.4	0.16	1*n*	A

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...Lewis (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXIII**, 403)...A (3639)(*Bul. L. O.* No. 11)...]

42 54 **11981. Hn 53.** Unchanged.

1886.79	1°.5	1″.73	4*n*	LM
1887.71	358.0	1.73	3*n*	Com

[β^4...LM...Com (**VI**)...]

42 56 **11982. H 1811.** The only observations since Herschel are:

1879.74	153°.7	5″.61	1*n*	Cin^6	8.5... 9.0
1905.54	153.4	6.08	2*n*	β^6	9.3...10.2

43 8 **11983. H 1813.** The only measures are:

1904.98	61°.6	9″.36	2*n*	Espin	8.9...9.0
1906.02	61.8	9.45	1*n*	β	9.5...9.5

[Espin (*Mon. Not.* **LXVI**, 143)...β^6...]

43 11 **11984. A. G. 288.** Double in *A. G. Lund.* Measures by β^6.

11985. τ^2 *Aquarii.* **H VI. 97** (= **S 818.**) The proper motion is 0″.047 in 233°.5 (Auwers.) The following are all the measures: 43^m 14^s

1783.60	288°.5	123″.61	1*n*	H	
1825.30	292.4	133.44	2*n*	S	5...12
1830.57	292.7	132.05	1*n*	Da^1	
1900.65	294.1	133.14	2*n*	β^6	... 9.5

11986. β 1219. Discovered with the 12-inch; a difficult pair with that aperture. There is a 6″ pair *np* 5′. 43 27

1896.87	299°.3	0″.48	3*n*	A

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3466)...]

11987. Ho 190. The only later measure is: 43 38

1894.80	152°.2	1″.27	1*n*	Ho

[Ho (2779, 3558)...]

11988. S 820. (= **σ 768.**) There is nothing in this place. There is an error of about 8^m R. A.; the principal star is OΣ 484, and the companion Σ 2965, both close pairs (See Nos. 12088 and 12080.) 44 .

11989. Σ 2945. (= **S 819.**) Without change. In D.M. 7.5 m. 44 2

1868.05	113°.5	3″.83	4*n*	Δ
1893.68	113.9	3.99	2*n*	Gla
1902.62	114.8	4.39	2*n*	Hu
1903.66	113.7	4.14	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...Da^1...H (**VII**)...Wr...Se...Δ (**II**)...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LXIV**, 806)...]

11991. Σ 2946. Without change. 44 14

1870.37	256°.4	5″.11	6*n*	Δ
1879.89	256.2	5.08	3*n*	Sp
1890.78	255.8	5.01	3*n*	Giacomelli
1902.62	256.5	5.33	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII, XV**)...H^1...Bp...Se...Wr...Ba (**II**)...Du...Ra (**XXIV**)...Δ (1195)...Δ (I, **II**)...Giacomelli (**III**)...Glasenapp (**III**)...Sp (**II**)...Bowyer (*Mon. Not.* **LXIV**, 806)...]

11995. β 846. Discovered with the 15½-inch at the Washburn Observatory. The other measures are: 44 34

1886.84	94°.8	2″.11	3*n*	UL
1888.82	92.2	1.67	3*n*	Com
1900.45	88.1	1.71	3*n*	Doo

[β (**XII**)...β^4...UL...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

11996. H 1816. Probably fixed. 44 36

1879.52	136°.2	6″.39	1*n*	Cin^6	8.5...8.5
1906.04	136.5	6.65	2*n*	β^6	9.5...9.7

44^m 54^s **11997.** Σ 2947. (= H I. 51.) The principal star, Groombridge 3904, has a proper motion of 0″146 in 66°6 (Schroeter). The relative change is slow.

1832.45	76°0	2″98	3*n*	Σ
1867.23	69.7	3.35	6*n*	Δ
1889.74	66.4	3.68	3*n*	Hl
1889.81	66.3	3.60	1*n*	HΣ
1903.51	65.9	3.46	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^1...H^2...H (**IV**)...Wr...Se...Ra (**XXIV**)... Flm.... Δ (*Mem. Accad. Sci.*).... Δ (1036, 1196, 1573).... Δ (**I, II**).... Big... Do (3799)(*Trans. R. I. Acad.* **XXIX**, Part 13).... Je (2450).... En (2678).... Hl (**II**).... Thackeray (*Mon. Not.* **LI**, 398).... *Proc. Haverford Coll. Obsy.* 1891–2...Glasenapp (**II**)...HΣ (**XII**)...Maw (**IV**)...Thiele (3837)...]

45 5 **11998.** **H** 3147. The later measure gives a smaller angle.

1905.93	238°7	28″68	1*n*	β^6	9.0...12.0

45 11 **11999.** **H** 1817. The measures since H are:

1904.74	239°5	10″46	2*n*	Espin	9.0...9.4
1905.70	239.2	11.33	1*n*	β	9.5...9.6

[Espin (*Mon. Not.* **LXVI**, 143)...β^6...]

45 20 **12000.** OΣ 530. A pair of small stars: not in D.M. Relatively fixed. The measures credited to this pair by Hu (Pub. *L. O.* V.) belong to OΣ 529, which is 4^m 18^s *p*.

1869.76	210°9	4″97	2*n*	Δ
1904.56	211.9	5.09	3*n*	β

[OΣ (**IX**)...Δ (**I**)...β^6...]

45 20 **12001.** Σ 2948. No change since Struve.

1869.86	4°3	2″62	5*n*	Δ
1894.62	5.5	2.67	2*n*	Gla
1903.76	3.2	2.65	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^1...H (**IV**)...Δ (**II**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Cin^6...Jones (*Proc. Haverford Coll. Obsy.* 1892) ..Glasenapp (**III**)...]

45 31 **12004.** From H (V), and called Σ 2951 *rej.*, but that pair is 1^m 20^s *f* (See No. 12023). The 40-inch shows a nearer companion. C is DM (52°) 3305.

AB	1902.47	175°2	4″35	2*n*	β^6	9.4...10.2
AC	1902.47	225.9	24.82	2*n*	β^6	...10 0

45 33 **12006.** **Hn** 54. Probably fixed.

1884.26	9°3	1″95	5*n*	En	8.6...9.3
1888.46	192.5	1.89	3*n*	Com	9.0...9.7

[β^4...En (2742)...Com (**VI**)...]

45 41 **12008.** **Ho** 482. No other measures. A distant star 9 m, 198°8: 50″55 (1893.79) 1*n*.

[Ho (3234)(*A. J.* 215)...]

12010. β 1332. Found with the 40-inch in looking for No. 12004. No other measures. 45^m 52^s

12012. β 177. Discovered with the 6-inch. Unchanged. 45 55

1867.86	276°6	3″07	1*n*	Hd
1877.71	278.6	2.78	2*n*	Cin
1892.70	278.6	2.94	2*n*	Wilson
1893.84	276.1	2.55	2*n*	Sellors
1898.68	276.4	2.79	3*n*	Boothroyd

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Hd (pp. 23, 60)....Cin^3...Cin^4....Sellors (3240)...Wilson (   )...Boothroyd (*A. J.* 478)...]

12014. Σ 2949. Fixed. 46 15

1866.88	181°8	11″18	3*n*	Δ
1905.91	182.1	11.32	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...β^6...]

12016. **Ho** 298. No later measures. 46 19

[Ho (2977)...]

12017. **H** 1823. (AC = OΣ (App) 237; CD = **H** 1822). Probably fixed. 46 23

AB	1905.65	259°1	19″35	2*n*	β
AC	1885.27	338.2	82.09	2*n*	Franz
	1905.65	338.0	81.93	2*n*	β
CD	1905.65	139.2	4.79	2*n*	β
AE	1885.27	263.0	117.93	2*n*	Franz

[Δ (**I**)...Franz (3080)...Espin (3717)...β^6...]

12019. β 451. Discovered with the 18½ inch. This star has a proper motion of 0″097 in the direction of 85°9 (Auwers). 49 37

1888.71	128°5	29″60	3*n*	β	...12.0
1898.62	130.6	29.24	4*n*	Doo	...10.2
1899.55	131.1	28.84	2*n*	β	...12.5
1900.78	131.3	29.00	2*n*	Doo	...11.2

These measures give 0″129 in 64°2 for the proper motion of A.

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)...β (2875)(*Pub. L. O.* **II**)(*Pub. Y. O.* **I**) ...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

12021. Σ 2950. B. A. C. 7973. Some change in the angle. The components have a common proper motion which is given from meridian observations: 46 40

Bossert	0″116 in 69°8
A. G. Hels.	0.115 in 71.2

The relative change is a slow decrease in the angle.

1832.25	319°1	2″04	4*n*	Σ
1847.94	318.1	2.06	2*n*	Ma
1854.70	316.4	2.32	5*n*	Δ
1869.92	315.7	2.10	5*n*	Δ
1883.73	311.7	2.27	6*n*	En
1892.77	304.0	2.17	2*n*	Gla
1902.95	309.4	2.14	3*n*	Do

[Ma (*F. S.* I)...Ma (**XI, XIII**)...H (**IV**)...H¹...H²...Wr...Se...Ra (**XXV**)... *Gr. Obsns.* 1840...Flm...Δ (*Mem. Accad. Sci.*)...Δ (1036, 1196)...Δ (I, II) ...Ferr...Je (2450)...En (2678)...Jones (*Proc. Haverford Coll. Obsy.* 1892)... Glasenapp (II)...Espin (*Brit. Ast. Ass'n.* **III**, 228)...Do (3799, 3931)...Maw (**IV**)...]

46m 46s **12022.** **H 1826.** There is another small star a little nearer:

AB	1905.71	356°.0	21′.53	2*n*	β^6	8.1...12.5
AC	1905.71	191.7	29.48	2*n*	β^6	...11.0

46 51 **12023.** **H 3150.** (= Σ 2951 *rej.*). These are all the measures:

1831.80	113°.4	21′.10	1*n*	H	9–10 = 9–10
1902.47	111.6	19.16	2*n*	β	9.0...9.0

[H²...H (**V**)...β⁶...]

47 21 **12027.** **H 302.** The only later position is:

1905.76 336°.6 14′.10 1*n* β^6 9.7...12.0

DM (10°) 4832, 4m 3s *p* and 10′.5 *n* of H 302, is a similar pair, and was measured at first for the other.

1905.75 276°.0 13′.20 2*n* β^6 9.5...10.9

47 44 **12029.** **Ho 483.** The *f* star of a small triangle. No other measures.

[Ho (3234)...]

47 50 **12030.** **H 1825.** "Very delicate; could not verify it, having mislaid the high power." Distance about 1′.2, and magnitudes, 9.0...10.0 (1876.) The only measure is recent:

1900.61 222°.7 1′.77 2*n* β^5 9.0...9.3

47 53 **12031.** **Ho 191.** No other measures.

[Ho (2779)...]

47 55 **12032.** **OΣ 482.** B. A. C. 7990. No relative change, but the components have a small common proper motion:

Auwers	0′.044 in 14°.0
Battermann	0.047 in 34.2
Greenwich	0.054 in 25.2

1869.44	33°.5	3′.59	5*n*	Δ
1889.31	35.9	3.40	3*n*	β
1898.69	33.8	3.57	3*n*	Hu
1901.65	34.1	3.47	3*n*	Doo

[OΣ (**IX**)...Δ (I)...β (2930)(*Pub. L. O.* **II**)...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12035. Σ 2953. Fixed. 46m 2s

1868.75	138°.5	8′.24	4*n*	Δ
1895.75	138.3	8.24	2*n*	Gla
1903.77	138.9	8.44	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H¹...Δ (**II**)...Cin⁶...Glasenapp (**IV**)...]

12036. **β 382.** (AC = **H** 1828). The close pair was discovered with the 6-inch. This is a binary in slow direct angular motion. A naked-eye star in *Lacerta;* the Harvard photometric magnitude is 5.7. The distant companion discovered by Herschel is evidently fixed. It is called blue by Δ. The principal star is Groombridge 3918. The following are all the measures: 48 18

A and B

1876.39	205°.7	1′.07	7*n*	Δ
1881.70	210.1	1.09	3*n*	β
1882.68	219.0	1.13	1*n*	Perry
1883.74	217.1	1.33	6*n*	En
1885.64	210.3	1.11	2*n*	HΣ
1889.44	219.3	1.03	2*n*	Maw
1889.53	217.6	0.98	3*n*	β
1893.53	221.3	0.91	3*n*	Lv
1893.97	226.0	1.00	8*n*	Barnard
1893.99	223.5	0.87	5*n*	Sp
1896.56	223.8	0.73	1*n*	Lewis
1897.82	225.7	0.97	1*n*	Dyson
1897.86	221.2	1.07	3*n*	A
1897.96	225.1	0.64	1*n*	Bowyer
1898.00	228.9	1.06	1*n*	Maw
1899.78	226.8	0.79	1*n*	Bryant
1899.89	232.0	0.75	1*n*	Lewis
1900.89	228.4	0.92	2*n*	A
1903.16	231.8	0.85	2*n*	A
1903.71	234.3	0.95	1*n*	Biesbroeck
1903.99	237.4	0.89	1*n*	Lewis

AB and C (= H 1828)

1828	350°.4	20″ ±	1*n*	H
1876.24	353.6	26.43	3*n*	Δ
1881.70	353.8	27.01	3*n*	β
1882.68	357.0	27.78	1*n*	Perry
1885.68	354.3	26 85	1*n*	HΣ
1889.53	353.7	26.92	2*n*	β
1898.02	354.4	27.18	1*n*	Maw

The proper motion of AB is 0′.020 in 246°.4 (Greenwich).

[β (**VI**)....β (2062, 2957)....β⁴....β (*Pub. L. O.* **II**)....Δ (**I**)....Perry (*Eng. Mech.* **XXXVI**, 65)...En (2678)...Lv (*A. J.* 382)...Barnard (*A. J.* 447)...Sp (**III**)... HΣ (**XII**)....Maw (**I, III**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXIV**, 806)...Biesbroeck...A (*A. J.* 429)(*Bul. L. O.* No. 11)...]

12037. **Σ 2952** *rej.* From H (IV). Probably fixed. Lalande 44815. 48 28

1879.61	135°.4	17′.93	1*n*	Cin	7.5...10.0
1902.76	136.6	17.52	2*n*	Hu	
1905.91	137.0	17.11	2*n*	β	7.5...10.5

[Cin⁶...Espin (*Brit. Ast. Ass'n.* **III**, 229)...β⁶...]

48m 28s **12038.** OΣ (App) 238. (= H VI. 100.) B is Rad.[1] 5877. No change since 1875. The distance in H is evidently too small. The principal star is given a proper motion of 0″.070 in 104°.0 (Schroeter). There is a faint companion to B, 250° · 25″ (1876).

1783.62	278°.1	61″.90	1*n*	H
1875.48	280.9	69.05	3*n*	Δ
1883.39	280.7	69.33	5*n*	Franz
1904.55	280.8	69.08	1*n*	β

[Δ (I)...Franz (2650)...β^6...]

48 30: **12040.** H N. 135. The description in H is, "Double 1st Class, both very small. One-third from 74 *Aquarii* towards 93 (ψ). In the finder it appears to be double, owing to a star very near it."

There is nothing of Cl. I in, or very near this place. Certainly an error in position of H. It is probably Σ 2970 (No. 12117). In that case the distant star referred to would be SD (12°) 6403, which is about 3′ from the Struve pair. This agrees with Herschel's position with reference to 74 and 93 *Aquarii* in R. A. and declination. The R. A. could not be 22h 48m, and must be at least 22h 55m.

48 40 **12041.** H 3152. "Large star very *red*. A very difficult object. Measured with 320, which still left a suspicion of illusion, though I have hardly a doubt."

Not seen with the 6-inch; and looked for with the 18½-inch without finding any pair in or near this place. The 40-inch showed no companion in 1900. The place given by H corresponds to that of the 9m star, Lalande 44810.

[β^1...β^5...]

48 41 **12042.** Σ 2955 *rej.* Measures from H (V). Nothing later but the following:

1879.63	335°.7	23″.67	1*n*	Cin°	7.5...10.5
1902.79	337.1	22.76	2*n*	Hu	

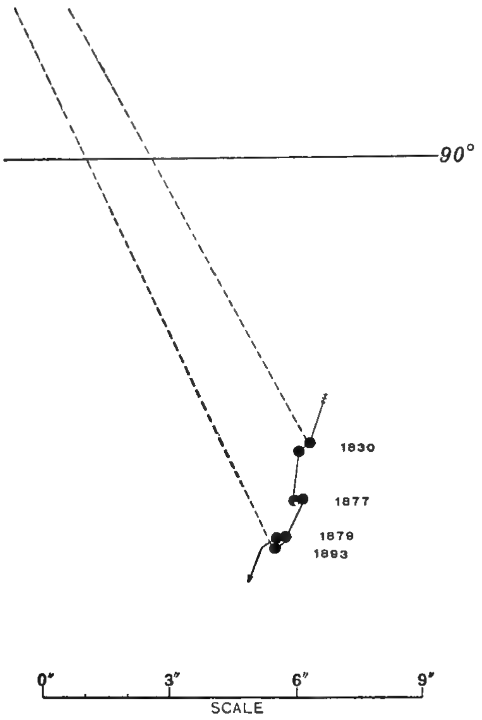
48 45 **12043.** β 847. Discovered with the 15½-inch at the Washburn Observatory. The later measures show no change.

1883.79	37°.5	6″.51	5*n*	En
1886.85	36.4	6.69	4*n*	UL
1887.82	36.0	6.75	3*n*	Com
1891.88	35.5	6.41	1*n*	β
1902.49	35.3	6.60	5*n*	Doo

[β (XII)...β^4...β (3114)(*Pub. L. O.* II)...UL...Com (VI)...En (2678)...Doolittle (*Pub. Flower Obsy.* I, II)...]

48 51 **12044.** Σ 2954. One of the components has a small proper motion of about 0″.033.

1830.90	28°.6	36″.73	2*n*	Σ
1847.69	28.1	36.78	1*n*	Ma
1865.19	27.0	37.94	6*n*	Δ
1877.80	27.4	37.97	1*n*	β
1879.47	26.1	38.68	1*n*	Cin
1893.71	25.5	38.78	2*n*	Gla
1903.52	25.8	38.59	3*n*	β



Σ 2954.

[Ma (*F. S.* II)....Δ (1573)....Δ (II)....β^1....Cin^5....Flm....Glasenapp (III).... *Annals Toulouse Obsy.* III...β^6...]

12046. β 178. *Aquarii* 252. Discovered with the 6-inch. 48m 57s
The change, if any, is slow, but it can hardly fail to prove a binary. This is a naked-eye star in *Aquarius*, B.A.C. 7986 (= Piazzi XXII. 250). The Harvard photometric magnitude is 5.8. The proper motion is 0″.011 in 290°.9 (Battermann).

1879.58	319°.0	0″.78	1*n*	Cin
1884.87	321.5	0.68	1*n*	Ho
1886.77	322.1	0.86	3*n*	LM
1888.87	322.2	0.70	2*n*	Lv
1889.47	320.4	0.59	4*n*	Sp
1890.78	321.3	0.80	2*n*	T
1898.66	324.5	0.79	1*n*	Cogshall
1899.81	324.7	0.83	3*n*	Doo

[β (III)...β (*Mon. Not.* XXXIV, 59)...Δ (I)...Cin^4...Cin^5...Ho (2978)...LM...Lv^1....Sp (III)....T (3186)....Cogshall (*A. J.* 478)....Doolittle (*Pub. Flower Obsy.* I...]

12051. β 1010. Discovered with the 12-inch at Mt. Hamilton in 1881. Unchanged. 49 17

1892.89	134°.8	1″.28	1*n*	Ho
1899.79	136.1	1.16	5*n*	Doo

[β (**XIII**)...β^3...LM...Ho (3234)...Doolittle (*Pub. Flower Obsy.* **I**)...]

49^m 18^s **12052.** δ *Piscis Australis.* **β** 772. Discovered with the 6-inch at Mt. Hamilton. There seems to be no material change. The *Cape Catalogue* gives the large star a proper motion of 0″.09 in the direction of 360°.

1877.70	236°.5	4″.73	1*n*	Cin
1879.69	238.4	5 ±	5*n*	β
1881.84	235.8	4.91	5*n*	β
1891.88	239.7	4.78	3*n*	β
1896.71	235.6	5.14	2*n*	See
1898.64	236.9	5.21	3*n*	Cogshall
1901.76	241.7	5.05	2*n*	Doo

[β (**XI**)...β^2...β^3 p. 326...β (3114)(*Pub. L. O.* **II**)...Cin^4...See (3496)...Cogshall (*A. J.* 478)...Solá (3679)...Doolittle (*Pub. Flower Obsy.* **II**)...]

49 20 **12053.** **H** 974. "Yellow; blue; decided colors." H (V) 91°.5 : 40″ ± : 9...12. The principal star has a proper motion of 0″.11 in 213°.7 (*A. G. Albany*).

1901.53	88°.4	44″.30	2*n*	β^5	8.7...9.7

49 44 **12056.** **Σ** 2956 *rej.* Measures from H (V).

AB	1902.82	157°.8	32″.18	1*n*	Hu
AC	1902.82	278.2	68.25	1*n*	Hu

49 49 **12057.** **Hu** 785. The mean of this and another measure is:

1903.58	260°.4	0″.25	2*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

49 57 **12058.** **β** 383. The distant star, C, was discovered with the 6-inch, and B added subsequently with the 18½-inch. Change uncertain.

A and B

1877.82	119°.6	2″.67	1*n*	β
1891.80	118.7	2.58	3*n*	β
1899.79	116.3	2.61	5*n*	Doo
1903.95	114.6	2.96	1*n*	Lewis

A and C

1877.81	240°.3	15″.59	2*n*	β
1891.80	239.0	15.43	3*n*	β
1899.79	239.6	15.58	5*n*	Doo
1903.95	243.5	16.47	1*n*	Lewis

[β (**VI**)...β^1...β (2062, 3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)... Lewis (*Mon. Not.* **LXIV**, 806)...]

49 58 **12059.** **β** 848. Discovered with the 15½-inch at the Washburn Observatory. The following are all the other measures:

1892.53	0°.2	2″.47	6*n*	Com
1899.27	0.8	2.57	2*n*	A
1901.13	4.2	2.54	6*n*	Doo

[β (**XII**)...β^4...Com (*Sid. Mess.* **IX**, 77)(*Pub. Washburn Obsy.* **VI, X**)...A (3639) ...Doolittle (*Pub. Flower Obsy.* **I, II**)...]

12060. **β** 712. Discovered with the 18½-inch. In a small cluster. The other measures are: 49^m 58^s

1877.70	290°.3	1″.14	1*n*	Δ
1893.72	293.5	1.24	3*n*	Wilson
1899.52	289.0	1.14	3*n*	Doo

[β (**X**)...β^1...Δ (**I**)...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...]

12061. **H** 975. (= **OΣ** (**App**) 239). Measures from H (IV). 50 9

1875.38	242°.6	49″.60	2*n*	Δ	5.7...8.3
1887.03	242.9	49.34	4*n*	Franz	
1905.66	242.8	50.33	3*n*	β	

[H (**IV**)...Δ (**I**)...Franz (3080)...β^6...]

12063. **Σ** 2957. Relatively fixed, but a common proper motion of 0″.275 in 126°.6 (*A. G. Berlin*). 50 26

1866.71	228°.2	4″.75	3*n*	Δ
1893.71	227.0	4.74	2*n*	Gla

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...UL...Glasenapp (**III**)...]

12064. **H** 3155. "Excessively difficult." Examined on two nights with the 40-inch in 1903, and no companion seen. 50 44

12065. **Σ** 2958. The change, if any, is in the angle. 50 52

1867.21	9°.6	3″.58	4*n*	Δ
1893.70	11.9	3.89	2*n*	Gla
1896.91	11.3	3.87	3*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...Se...Ferr...Δ (**II**)...WS...WS^2...Gl ...Glasenapp (**III**)...Hu (*A. J.* 397)...Maw (**III**)...Coleman (*Mem. R. A. S.* **LIII**)...Greenwich Obsy. (*Mon. Not.* **LXIII**, 403; **LXVI**, 32)...]

12068. 16 *Lacertae.* **Σ** 2960. (= **H̥** IV. 85 = **Sh** 351 = **OΣ** (**App**) 240). There seems to be some change in the distance of C. The principal star has a proper motion of 0″.029 in 258°.0 (Auwers). 50 55

A and B

1868.19	345°.1	27″.27	3*n*	Δ
1905.62	345.0	27.53	2*n*	β

A and C

1868.19	47°.5	63″.15	3*n*	Δ
1887.00	47.2	62.72	4*n*	Franz
1905.62	47.7	62.54	2*n*	β

The measures of C give 0″.016 for the proper motion of A.

[Ma (*F. S.* **II**)...Ma (**XIII**)...Δ (**II**)...Cin^5...Franz (3080)...β^6...]

12069. **Σ** 2959. (= **H̥** **N.** 15; BC = **β** 713). The faint star, C, was detected with the 18½-inch. The change in AB is obviously due to proper motion, and curiously this movement seems to belong, not to the large star, but to the small star B. 50 55

A and B

1832.10	96°7	15″66	4*n*	Σ
1864.78	102.7	14.21	5*n*	Δ
1877.87	102.2	13.77	2*n*	β
1888.89	103.4	13.47	2*n*	Hl
1891.82	103.3	13.31	3*n*	β
1898.54	105.7	13.13	2*n*	β
1902.82	104.8	13.08	1*n*	Hu

These measures give 0″046 in 243°6 for the most probable value of the proper motion of B.

B and C

1877.95	95°9	8″31	1*n*	β
1891.82	94.1	10.18	3*n*	β
1898.54	95.9	10.51	2*n*	β

[β (**X**)...β^{1}...β (3114)(*Pub. L. O.* **II**)...Ma (*F. S.* I)...Ma (**XI, XIII**)...Δ (**II**)...Δ (1573)...Pt...Cin^{4}...Hl (**II**)...Glasenapp (**II**)...Solá (3497)...]

(See p. 1085)

51^{m} 0^{s} **12071.** *a Piscis Australis.* **See 478.** No other measures. The large star has a proper motion of 0″338 in 118°2 (Bossert).

51 10 **12072.** **Σ 2963.** No change.

1868.71	354°3	2″30	4*n*	Δ
1904.58	354.7	2.22	1*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...Δ (II)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (II)...]

51 16 **12073.** **H 5371.** In O. Arg. S. 8m. "Double Cl. I." in *Cordoba Zones.*

1877.26	344°5	8″86	4*n*	Cin	8.0...9.2
1897.23	343.7	8.86	4*n*	See	7.7...9.7

[Cin^{3}...Cin^{4}...See (3496)...]

51 41 **12075.** **β 849.** Discovered with the 15½-inch at the Washburn Observatory. Change in angle and distance, probably from proper motion.

1881.53	127°0	3″74	4*n*	β
1888.39	128.0	4.15	4*n*	Com
1903.38	121.4	4.29	3*n*	Doo
1904.59	121.1	4.23	3*n*	β

[β (XII)...β^{4}...Com (VI)...Doolittle (*Pub. Flower Obsy.* II)...β^{6}...]

51 49 **12076.** **Σ 2961.** Without change.

1866.39	348°3	1″81	3*n*	Δ
1892.90	347.6	1.91	2*n*	Gla
1902.77	347.5	1.95	2*n*	Hu

[Ma (*F. S.* I)...Ma (X, XI, XIII)...H^{1}...H (IV)...Δ (1125, 1196)...Δ (I, II)...Glasenapp (II)...Lau (4078)...]

51 52 **12077.** (AB = **H 1833**). The close star discovered by Espin. The *f* star of the H pair is the brightest.

AB	1906.00	295°3	19″03	2*n*	β	9.6...
BC	1906.00	331.7	3.28	2*n*	β	10.0...11.2

[Espin (*Mon. Not.* **LXIV**, 680)...β^{6}...]

51^{m} 58^{s} **12078.** **β 452.** Discovered with the 18½-inch. No motion. The following are all the other measures:

1877.71	255°3	6″29	1*n*	Δ
1885.64	254.9	6.67	2*n*	HΣ
1892.84	256.2	6.78	2*n*	Wilson
1902.44	254.7	6.71	3*n*	Doo

The proper motion of the principal star is 0″049 in 78°1 (Greenwich).

[β (**VIII**)...β (*Am. Jour. Sci.* July 1877)...β^{3}...Δ (I)...Wilson (   )...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

52 2 **12080.** **Σ 2965.** Without change.

1868.93	219°0	2″82	4*n*	Δ
1881.55	218.8	3.07	4*n*	β
1898.77	218.8	2.93	3*n*	Hu

[Ma (*F. S.* I)....Ma (**XI**)....H^{1}....H (**IV, V**)....OΣ (**IX**)....Δ (**II**)....Do (3023) (*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (**II**)...β^{4}...Hu (*Pub. L. O.* **V**)...]

52 13 **12083.** **H 1832.** The only later position is:

1904.68	73°8	10″97	2*n*	Espin	8.8...9.2

52 16 **12084.** **Ho 484.** No other measures.

[Ho (3234)...]

(See p. 1085)

52 28 **12088.** **OΣ 484.** (AC = **Σ 2966** *rej.*). Change in the close pair is doubtful. All the measures are given:

1846.42	117°7	0″36	2*n*	OΣ
1855.56	99.3	0.46	2*n*	OΣ
1867.66	89	Obl?	2*n*	Δ
1880.55	91.9	0.33	3*n*	β
1889.81	88.9	0.3±	2*n*	HΣ
1894.69	107.1	0.3±	2*n*	Gla
1898.78	75.9	0.21	3*n*	Hu

There is no change in the distant companion.

AB and C

1881.54	256°6	30″91	2*n*	β
1894.69	255.4	30.77	2*n*	Gla
1898.78	256.1	30.83	3*n*	Hu

The principal star of this triple, and A of Σ 2965 make the wide pair S 820. This is given by S with large error in R.A. (See No. 11988). There appears to be no proper motion in either pair:

AB (OΣ 484) and A (Σ 2965)

1825.27	279°3	120″89	3*n*	S
1881.55	280.0	121.19	4*n*	β
1906.12	279.9	120.34	1*n*	β

[OΣ (**IX**)...H (**IV, V**)...Δ (**I**, p. 230)...β^{3}...β^{4}...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...β^{6}...]

52 29 **12089.** **H 1834.** "Unless P = 269°0" of AC. Examined and C found to be almost exactly *p* (1876). The only measures are of recent date:

AB	1905.74	166°9	26″23	2*n*	β^{6}	8.8...11.0
AC	1905.74	270.2	58.27	2*n*	β^{6}	... 9.0

There is a 13.5 m star from A, 5°8:29″0.

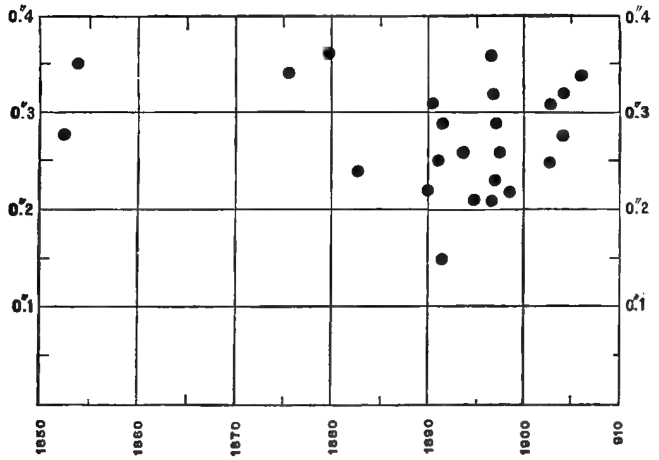
52^m 30^s **12090.** OΣ 536. This system has a large proper motion which is given from meridian positions:

Porter	0″.397 in	111°.5
Kustner	0.397 in	110.5
Glasgow	0.399 in	109.9
Paris	0.408 in	112.0
OΣ	0.399 in	114.9

The last value is from measures by OΣ of a 9m star about 4′ distant *n f.*

At one time it was supposed that an occultation had taken place about 1859, but this pair is always difficult with moderate apertures under ordinary conditions, and the observations finding it single at various times have no significance. There has been no sensible change in the distance, and the angle appears to have remained practically constant at about 165°. The following are all the measures:

1852.67	164°	0″.25±	1*n*	OΣ
1852.67	152.8	0.3±	1*n*	OΣ
1853.91	163.7	0.35±	1*n*	OΣ
1861.66	(260)	Obl.?	1*n*	OΣ
1866.74	(289)	....	1*n*	Hd
1875.56	148.1	0.34	1*n*	Δ
1877.76	171.5	0.47	1*n*	β
1879.77	167°.3	0″.36	3*n*	Hl
1882.62	151.7	Obl.	1*n*	OΣ
1882.76	167.5	0.24	1*n*	Hl
1889.96	159.3	0.22±	1*n*	Sp
1890.74	139.2	0.31	1*n*	Hl
1890.99	162.5	0.25±	2*n*	Sp
1891.57	164.8	0.15	3*n*	β
1891.72	141.4	0.29	2*n*	Hl
1891.76	177.1	0.15±	1*n*	HΣ
1893.79	165.4	0.26	3*n*	Barnard
1893.96	171.3	0.26±	4*n*	Sp
1894.87	165.7	0.21	3*n*	Barnard
1896.55	170.5	0.36	3*n*	Lv
1896.37	166.8	0.21	3*n*	A
1896.83	185°.9	0″.32	1*n*	Lewis
1896.97	162.5	0.29	1*n*	Hu
1897.02	161.5	0.23	3*n*	A
1897.57	165.8	0.26	3*n*	A
1898.57	163.8	0.22	5*n*	Hu
1902.80	151.5	0.25	1*n*	Bryant
1902.87	164.5	0.31	2*n*	Lewis
1903.59	167.1	0.19	3*n*	β
1903.92	169.8	0.28	1*n*	Bryant
1903.95	162.2	0.32	1*n*	Lewis
1905.84	169.8	0.34	2*n*	A



OΣ 536.

The principal measures of the distance are shown on the diagram. It is evident that no occultation, or reversal of the position-angle, can have occurred since the first measures, and that there has been no sensible change in the distance. It is certainly a physical system with a period of probably many centuries in length.

[OΣ (**IX**)(**X**, pp. 117, 200)(*Mon. Not.* **XX**, 11)... Δ (**I**)... Flm... Hd... Big... de Ball (2753)... Hl (*Wash. Obsns.* 1882)... Hl (**I, II**)... β1... β (3114)(*Pub. L. O.* **II**) ... Hu (*A. J.* 397)... Lv (*A. J.* 407)... A (3396, 3466)... Barnard (*A. J.* 447)... HΣ (**XII**)... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXIII**, 403; **LXIV**, 806)... Hu (*Pub. L. O.* **V**)... β6...]

12091. OΣ (App) 241. Unchanged. 52^m 33^s

1876.53	161°.0	84″.04	3*n*	Schur
1905.62	160.7	84.72	2*n*	β

[Δ (I)... Schur (2255)... β6...]

12092. Σ 2962 *rej.* Description from H (VII). The principal star has a proper motion of 0″.059 in 270°.0 (Battermann). The only measure is: 52 44

1905.62 201°.5 20″.27 2*n* β6 8.0...10.5

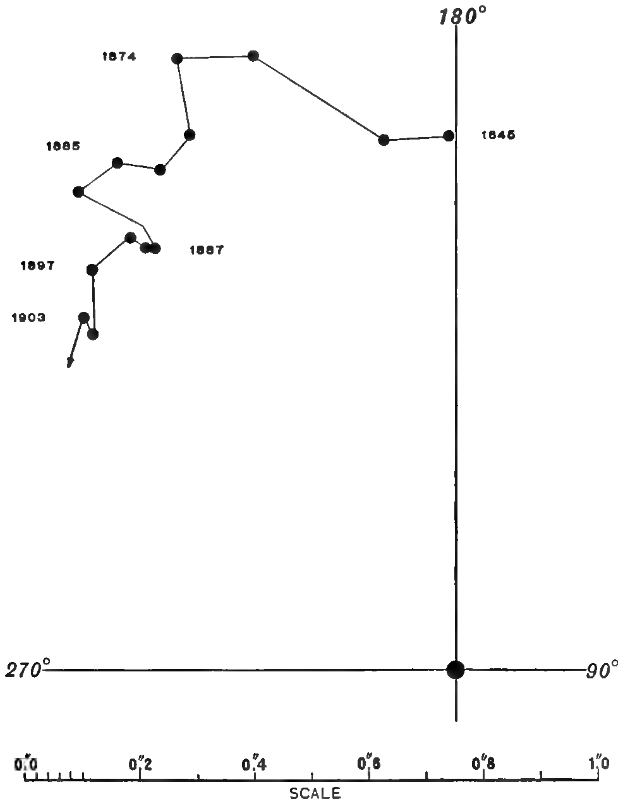
12094. 52 *Pegasi.* OΣ 483. A binary system of long period. The proper motion is given 53 12

Auwers	0″.031 in	168°.9
Newcomb	0.055 in	149.0

The following measures are sufficient to show the relative change in the last sixty years:

1845.28	180°.8	0″.94	2*n*	OΣ
1852.78	187.9	0.94	3*n*	OΣ
1865.24	198.5	1.14	4*n*	Δ
1874.52	204.7	1.18	4*n*	Δ
1879.53	206.6	1.05	4*n*	Hl
1883.71	211.0	1.02	2*n*	Per
1885.80	214.1	1.07	3*n*	Hl
1886.94	218.6	1.07	2*n*	Young
1887.93	215.9	0.91	3*n*	Sp
1889.02	216.7	0.92	9*n*	Sp
1894.13	217.3	0.95	9*n*	Com
1897.56	222.6	0.95	7*n*	Hu
1900.79	227.7	0.87	3*n*	Do
1903.83	226.9	0.90	2*n*	Biesbroeck

[Ma (**XIII**)....Da^{3}....Se....OΣ (IX)....Δ (**I**)....Flm....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)...Do (2330, 3023, 3466, 3681)...WS...Sk...Pl...Perry (*Eng. Mech.* **XXXIX**, 11)...Per...Per 2560)...Je (2450)...En (2678)...de Ball (2753)....T (2866)....Hl (**I, II**)....Hl (*Wash. Obsns.* 1885)....Sp (**II, II** App, **III**)....Jones (*Proc. Haverford Coll. Obsy.* 1892)...Maw (**I, III**)...Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)....Com (**X**)....Coleman (*Mem. R. A. S.* **LIII**)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXI**, 486; **LXII**, 383; **LXIII**,



52 Pegasi. OΣ483.

403; **LXIV**, 906)....*A. G. Leipzig*, p. 211. ..Hu (*A. J.* 397)(*Pub. L. O.* **V**)....Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)...Sk^{5}...Callandreau (*Bul. Ast.* **XII**, 523)...Biesbroeck...]

53^{m} 12^{s} **12095.** **Σ 2967.** (= S 821). No change.

1867.69	6°9	6″75	4*n*	Δ
1893.71	5.9	6.65	2*n*	Gla
1905.95	7.6	6.70	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...Da^{1}...Δ (**II**)...Glasenapp (**III**)...β^{6}...]

53 18 **12096.** 2 *Piscium.* **Barnard 18.** Discovered by Barnard with the 12-inch at Mt. Hamilton. No change. The proper motion is 0″094 in 141°7 (Auwers).

1894.86	93°0	3″87	6*n*	Barnard
1898.67	93.1	3.63	3*n*	Barnard

[β (2957, 3114)(*Pub. L. O.* **II**)...Barnard (*A. J.* 447)...]

12097. **Σ 2964.** (= H̥ N. 90). No change. 53^{m} 29^{s}

1865.92	281°9	8″93	3*n*	Δ
1905.61	282.1	9.09	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**VIII**)...Se^{1}...Hd...Δ (**II**)...Cin^{4}...T (3186)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...β^{6}...]

12098. **A 192.** No other measures. 53 38

[A (3741)(*Bul. L. O.* No. 3)...]

12099. **H 1836.** H has two observations, differing 1$^{\mathrm{m}}$ in R.A. Examined and identified as here given (1876). The only measures are recent: 53 44

1905.94	237°6	14″93	2*n*	β^{6}	8.7...10.0

A similar pair, DM (50°) 3916, which is 3$^{\mathrm{m}}$ 13$^{\mathrm{s}}$ *f* and 20′ *n* of H 1836, was at first measured for that pair.

1906.01	225°8	15″84	2*n*	β^{6}	8.8...11.0

12100. **H 1837.** Only this since H: 53 46

1905.74	350°8	19″64	1*n*	β^{6}	9.5...11.5

12101. **Hn 55.** Later measures give: 53 55

1888.52	191°9	2″14	3*n*	Com

[β^{4}...Com (**VI**)...]

12102. **H 1838.** "Oblong with 160; resolved with 320." A pretty pair, but brighter (1876) than given in H. The components appear to have a common proper motion, 0″106 in 80°8 (Schroeter). These are all the measures: 53 59

1879.75	265°9	2″10	2*n*	Cin	10.0...11.0
1881.52	269.8	1.80	3*n*	β	8.4... 8.6
1903.65	266.1	1.66	5*n*	β	8.6... 8.8

[β^{4}...Cin^{6}...β^{6}...]

12103. **Ho 192.** The following are all the other measures: 54 3

1894.16	28°9	1″30	3*n*	Ho
1902.04	30.3	1.61	7*n*	Doo
1905.74	34.1	1.37	1*n*	β

[Ho (2779, 3234, 3558)...β^{6}...]

12104. **Hn 56.** The other measures are: 54 11

1883.88	122°4	1″01	5*n*	En
1888.55	120.3	0.99	3*n*	Com

[β^{4}...En (2742)...Com (**VI**)...]

12105. **Σ 2971.** Without change. 54 12

1868.51	4°9	5″34	4*n*	Δ
1905.94	4.1	5.18	2*n*	β

[Ma (*F. S.* **I**)....Ma (**XI**)....Δ (**II**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (**II**)...Cin^{6}...Lau (4078)...β^{6}...]

54^m 22^s **12106.** **β 850.** Discovered with the 15½-inch at the Washburn Observatory. No change.

1886.84	118°1	3″08	3*n*	UL
1888.03	119.1	3.29	3*n*	Com
1900.78	118.7	2.73	2*n*	Doo

[β (**XII**)...β^4...UL...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

54 24 **12107.** **A 785.** With other measures (*Bul. L. O.* No. 61) the mean is:

1904.56	25°0	1″05	3*n*	A	9.2...9.7

54 26 **12108.** **β 179.** An unimportant pair noted with the 6-inch. No relative change. The proper motion seems to be uncertain

Argelander	0″398 in 236°4
Kustner	0.090 in 180

The later measures are:

1892.70	116°9	13″26	2*n*	Wilson
1892.75	114.7	12.74	2*n*	Gla
1896.84	115.3	13.65	2*n*	See

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....Cin^3...Cin^4....Cin^5....Wilson ( )....See (3496)...Glasenapp (**II**)...]

54 56 **12110.** **H 3158.** "Almost certain that this star is double. P and D from diagram." Looked for unsuccessfully with 6-inch in 1873, but readily found in 1876. Probably unchanged. The magnitude in DM is 8.6.

1881.57	215°8	1″02	3*n*	β	8.5...8.5
1885.57	213.1	1.29	2*n*	HΣ	7.8...8
1903.61	215.1	0.88	3*n*	β	9.0...9.3

[β (*Mon. Not.* **XXXIV**, 381)...β^4 ..HΣ (**XII**)...β^6...]

54 58 **12111.** **Σ 2968.** *Pegasi* **263**. Lalande 45023. Fixed.

1866.06	93°4	3″09	3*n*	*Δ*
1893.69	92.0	3.41	2*n*	Gla
1902.77	91.3	3.51	1*n*	Hu
1904.91	92.6	3.49	1*n*	Lewis

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^1...H (**VII**)...Bp...Da^3... Ba (**II**)...WS...Gl....*Δ* (**II**)....Glasenapp (**III**)....Bowyer and Lewis (*Mon. Not.* **LXIV**, 806; **LXVI**, 32)...]

54 58 **12112.** **H 1840.** Only this later:

1905.74	287°3	19″16	2*n*	β^6	8.7...11.1

55 18 **12113.** **Σ 2969.** Fixed.

1868.84	34°7	3″87	4*n*	*Δ*
1893.69	33.7	4.10	2*n*	Gla
1902.76	34.4	4.15	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...Glasenapp (**III**)...Lewis (*Mon. Not.* **LXVI**, 32)...]

55 44: **12114.** **Hd 174.** I could find nothing in this place (1876). It may be β 179. (No. 12108).

12115. **β 1011.** Discovered with the 12-inch at Mt. Hamilton in 1881. Apparently fixed. The Cordoba magnitude is 6.6; Yarnall 6.4. The later measures are: 55^m 53^s

1886.95	301°2	2″26	1*n*	Pollock
1891.81	293.0	1.94	1*n*	Sellors
1896.72	291.5	1.61	4*n*	See
1898.73	297.4	2.14	1*n*	Boothroyd
1898.74	300.9	2.28	3*n*	A

[β (**XIII**)...β^3... Pollock (*Pub. Sydney Obsy.* 1891)(*Mem. R. A. S.* **L**)... Sellors (3154)...See (3496)...Boothroyd (*A. J.* 478)...A (3585)...]

12116. **A 193.** No other complete measure. 56 0

[A (3741)(*Bul. L. O.* No. 3)...Lau (*Bul. Ast.* **XXII**, 238)...]

12117. **Σ 2970.** Relatively fixed. H N. 135 is probably identical with this (See No. 12040). 56 6

1866.07	38°3	8″42	3*n*	*Δ*
1894.61	38.4	8.71	2*n*	Gla
1902.82	37.9	8.54	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...H (**V**)...H^3...Se...*Δ* (**II**)...Cin^6...Glasenapp (**III**)...Solá (3497)...]

12118. **β 384.** *Aquarii* **265**. Discovered with the 6-inch. In Cordoba 6.9 m. Lalande 45047. Change doubtful. 56 14

1877.34	73°3	1″18	3*n*	Cin
1886.81	70.4	1.27	1*n*	LM
1888.85	73.4	1.03	1*n*	Lv
1897.66	69.1	1.37	1*n*	See
1898.68	66.7	1.32	2*n*	Boothroyd

[β (**VI**)...β (2062)...*Δ* (**I**)...Cin^3...Cin^4...LM...Lv^1...See (3496)...Boothroyd (*A. J.* 478)...]

12119. **β 481.** Discovered with the 6-inch. Σ 2970 is 17^s *p* and 4′ *s*. Probably no motion. 56 23

1891.88	53°1	1″19	3*n*	β
1898.76	51.7	1.31	3*n*	Cogshall
1901.66	54.2	1.15	3*n*	Doo

[β (**IX**)....β (*Mon. Not.* **XXXVIII**, 78)....β^1....β (3114)(*Pub. L. O.* **II**)....LM....Cogshall (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12121. **Σ 2972** *rej.* From H (V). If the observations belong to the same star, there would seem to be some change in the angle. 56 34

1830	198°0	12″ ±	1*n*	H	9–10...14
1879.63	166.6	.....	1*n*	Cin	9.0...12.0
1901.60	147.9	15.49	2*n*	β	9.3...11.7

The magnitude in DM is 9.2. There are two other similar pairs in the immediate vicinity, the first about 20′ *sp* Σ 2972 *rej.*, and the other 13′ *sf*, which I have measured:

DM (−0°) 4445

1901.60	159°1	24″40	1*n*	β	8.5...12.7

DM (−0°) 4453

1901.60	172°7	19″14	1*n*	β	10.8...10.9

The DM magnitude of the last star is 9.5.

[H (**V**)...Cin^5...β^5...]

(See p. 1085)

56^m 34^s **12122. A 194.** No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

57 5 **12125.** 2 *Andromedae.* **β 1147.** This star was suspected to be a close pair with the 12-inch, and verified with the 36-inch. It is difficult with the large aperture. Auwers gives proper motion of 2 *Andromedae*, 0″041 in the direction of 109°8. This belongs to both stars. Slow direct motion in angle, with distance increasing. The following are all the measures:

1889.54	317°8	0″28	3*n*	*β*
1890.62	313.0	0.27	3*n*	*β*
1891.72	323.4	0.23	3*n*	*β*
1892.99	318.2	0.40±	3*n*	Sp
1893.46	323.9	0.50±	2*n*	Sp
1896.03	322.0	0.42±	1*n*	Sp
1898.79	329.6	0.36	2*n*	A
1900.70	332.1	0.35	3*n*	A
1902.70	339.3	0.39	1*n*	A
1902.92	325.2	....	1*n*	Lewis
1903.86	336.2	0.43	2*n*	Biesbroeck
1905.69	339.0	0.47	1*n*	A

[β (**XVI**)....β (2956, 3048, 3114)(*Pub. L. O.* **II**)....Sp (**III**)....A (3585)(*Bul. L. O.* No. 11)...Lewis (*Mon. Not.* **LXIII**, 403)...Biesbroeck...]

57 12 **12126. H 3162.** The only measure is:

1905.74	310°9	22″96	1*n*	*β*^{6}	8.8...12.0

57 16 **12128. Σ 2973.** No change.

1867.55	41°8	7″39	5*n*	*Δ*
1894.64	41.6	7.49	2*n*	Gla
1905.94	41.8	7.58	2*n*	*β*

[Ma (*F. S.* **I**)....Ma (**XI, XIII**)....H (**IV**)....*Δ* (**II**)....Cin^5....Glasenapp (**III**)....*β*^{6}...]

57 27 **12129. H 1841.** The only measures are:

AB	1905.72	344°9	18″22	2*n*	*β*^{6}	8.9...9.0
AC	1905.72	285.7	33.65	2*n*	*β*^{6}	...9.0

57 34 **12130. OΣ 485** *rej.* Rejected in second edition of *Poulkowa Catalogue.* Without change. Ma has a third star, 261°5: 45″± (1843.47) 1 n. The principal star is given a proper motion of 0″015 in 270° (*A. G. Harvard*).

1898.61	51°7	21″04	3*n*	Hu

[Ma (**XI**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

57 36 **12131. β 851.** Discovered with the 15½-inch at the Washburn Observatory. The other measures are:

1885.58	157°0	2″02	2*n*	HΣ
1888.92	160.4	2.14	3*n*	Com
1902.24	161.1	2.32	2*n*	Doo

[β (**XII**)....β^4....Com (**VI**)....HΣ (**XII**)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12133. A. G. 289. Double in *A. G. Berlin.* 57^m 56^s

1902.80	226°6	1″92	2*n*	Cg	9.0...9.5
1904.86	231.3	1.61	2*n*	Bowycr	9.0...9.5

[Hu (*Bul. L. O.* No. 44)...Cogshall (*A. J.* 546)...Bowyer (*Mon. Not.* **LXVI**, 32)...]

12134. β *Pegasi.* **H 1842.** The proper motion of the principal star is given from meridian observations: 57 56

Auwers	0″218 in 52°5
Greenwich	0.218 in 52.4
Newcomb	0.236 in 55.1

1879.51	208°2	98″38	2*n*	*β*	...11.2
1896.68	209.2	102.87	3*n*	Lv	
1903.41	209.5	103.71	4*n*	*β*	...11.1

The *β* measures of 1879 and 1903 give 0″243 in 52°1 for the proper motion of *β Pegasi.*

OΣ measures a very distant 9m star:

1852.67	95°45	264″21	1*n*	OΣ
1874.72	96.40	260.98	1*n*	OΣ
1903.41	97.34	256.72	3*n*	*β*

These measures give 0″224 in 47°8 for the proper motion.

[OΣ (**X**)...Bl (**V**)...Pk...*β*^{3}...Lv (*A. J.* 407)...*β*^{6}...]

12135. Ho 193. The later measures are: 57 57

1895.29	169°0	2″66	2*n*	Ho
1902.04	168.0	2.04	7*n*	Doo

[Ho (2779, 3558)...]

12138. OΣ 486 *rej.* Rejected in second edition of the *Poulkowa Catalogue.* Without change. 58 26

1845.84	276°7	33″84	1*n*	OΣ
1879.28	277.4	33.57	3*n*	Doubiago
1898.61	276.1	34.03	3*n*	Hu

[*Δ* (**I**)...OΣ (**X**)...Hu (*Pub. L. O.* **V**)...]

12139. A 195. No other measures. 58 40

[A (3741)(*Bul. L. O.* No. 3)...]

12140. Arg. 45. "Duplex" in O. Arg. N. Measures from Cin^5. Unchanged. 58 48

1900.92	15°2	3″29	3*n*	A	8.6...8.9
1902.60	18.1	3.49	2*n*	*β*	8.5...8.7

[Cin^5...A (*Bul. L. O.* No. 11)...*β*^{6}...]

12141. H 1845. The 40-inch shows a new and nearer companion: 58 50

A*a*	1904.59	325°3	9″50	2*n*	*β*^{6}	9.2...14
AB	1904.59	8.7	17.91	2*n*	*β*^{6}	...12.8
AC	1904.59	77.6	20.98	2*n*	*β*^{6}	...12.4

12142. H 3164. Nothing since H but this: 58 52

1901.67	129°7	55″08	2*n*	*β*^{5}	6.9...12.0

$58^{m}\ 53^{s}$ **12143.** 83 *Aquarii.* **A 417.** (AC = **Σ 59, App. I.**) 83 and 84 *Aquarii* make the wide pair, Σ 59, App. I. The first of these was found to be a very close pair by Aitken with the 36-inch in 1902. The measures show rapid motion in angle. The period will probably be a short one

A and B

1902.64	61°0	0″19	4*n*	A
1903.66	73.5	0.19	5*n*	A
1904.58	84.8	0.22	2*n*	A
1905.59	94.6	0.20	3*n*	A

AB and C

1868.87	146°7	260″98	5*n*	Δ
1878.36	146.8	260.83	7*n*	Je
1891.59	147.3	258.93	3*n*	Mai

The change in C is due to proper motion. Auwers gives:

83 *Aquarii* = 0″107 in 78°2
84 *Aquarii* = 0.011 in 15.1

[Ra (**XXV**)...Δ (**II**)...Je (2345)...Maiebckato (*Obsns.* 1892)...A (*Pub. A. S. P.* **XIV**, 166; **XV**, 217)(*Bul. L. O.* No. 29)...]

(See p. 1085)

59 10 **12144.** **OΣ 487.** B. A. C. 8048. The following are all the observations:

1844.91		Cert. obl.	1*n*	OΣ	
1846.72	69°	Parait obl.	1*n*	OΣ	
1847.91	28.6	Cuneiforme	1*n*	OΣ	
1852.69	54	Coneiforme	1*n*	OΣ	
1858.44	43	Soupçon obl.	1*n*	OΣ	
1865.79	Forma molto incerta		1*n*	Δ	
1866.44		Semplice	1*n*	Δ	
1889.81	205°9	0″2 ±	2*n*	HΣ	
1890.68	208.3	0.20	3*n*	β	6.9...8.7
1891.73	210.0	0.20	2*n*	β	
1897.85	213.8	0.33	1*n*	A	
1898.60	212.2	0.29	3*n*	Hu	

This is a difficult pair at all times, and on the whole there is no evidence of rapid motion. It has a small proper motion:

Auwers	0″036 in 90°0
Hamburg	0.029 in 90.0
Paris	0.030 in 90.0
Greenwich	0.064 in 60.9

[OΣ (**IX**)....Δ (**I**, p. 230)....β (3017, 3048, 3114)(*Pub. L. O.* **II**)....HΣ (**XII**).... A (3585)...Hu (*Pub. L. O.* **V**)...]

59 16 **12146.** **Howe 62.** Probably fixed.

1885.71	212°3	4″22	1*n*	Wilson	8.0...10.0
1900.80	210.7	4.50	2*n*	Doo	9.2...11.5

[Cin⁶...Lv¹...Wilson (Cin¹⁰)...Doolittle (*Pub. Flower Obsy.* **I**)...]

59 18 **12147.** **Σ 2974.** (= **S 822**). Unchanged.

1868.21	160°5	2″64	4*n*	Δ
1883.70	161.2	2.67	3*n*	Per
1893.69	162.3	2.63	2*n*	Gla
1903.66	161.5	2.70	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI**)...H¹...Da¹...Se...Wr...Δ (1196)...Δ (**I**, **II**)...Du... Per...Per (2560)...Glasenapp (**III**)...Ra (**XXV**)...Collins (*A. J.* 378)...Knorre (3518)...Bowyer and Lewis (*Mon. Not.* **LXIV**, 806; **LXVI**, 32)...]

12149. **Ho 485.** No change. $59^{m}\ 23^{s}$

1904.77	46°1	5″43	3*n*	Doo

[Ho (3234)...]

12151. **A 196.** No other measures. 0 3

[A (3741)(*Bul. L. O.* No. 3)...]

12154. *υ Gruis.* **β 773.** This star was suspected to be a close pair with the 6-inch at Mt. Hamilton in 1879. With the 12-inch in 1891 I could not be certain of any real elongation. It should receive further attention in southern latitudes. 0 12

[β (**XI**)...β²...]

12155. **H 5384.** The only later observation is: 0 18

1902.65	194°0	29″39	2*n*	β⁶	8.5...9.0

12156. **Kr 62.** Noted as "duplex" in *A. G. Hels.* 0 24

1898.42	324°6	5″51	4*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12159. **H 978.** The only measures are: 0 29

1879.63	288°6	14″78	1*n*	Cin⁵	8.5...10.0
1905.58	289.7	15.01	1*n*	β⁶	

12160. **Ho 194.** No late measures. 0 34

1885.84	59°9	0″3 ±	2*n*	Ho
1886.89	67.9	0.43	1*n*	Ho
1887.70	72.7	0.3 ±	1*n*	Ho

An observation by Lewis (Mon. Not. LIX, 425), called Ho 64, is not that pair, and may be Ho 194.

[Ho (2779, 2978)...]

12161. **H 3168.** The only measure: 0 38

1905.58	329°1	27″23	1*n*	β⁶	9.6...12.5

12163. **Σ 2975** *rej.* The only measures are by β⁶. 0 56

12164. **Ho 195.** Without change. 1 2

1884.14	356°8	3″77	3*n*	Ho
1895.81	357.2	3.81	1*n*	Ho
1902.74	357.0	3.93	4*n*	Doo

[Ho (2779, 3234, 3558)...]

12165. **OΣ (App) 242.** No motion. B is Rad.¹ 5956. 1 5

1905.53	31°2	79″67	2*n*	β

[Δ (**I**)...Franz (3080)...β⁶...]

12166. **H 1848.** A pair of small stars in the field with, and closely *f*, the 8.2 m star, DM (42°) 4581. 1 6

1902.63	292°7	9″20	2*n*	β⁶	12.0...12.7

$1^{m}\ 29^{s}$ **12169.** **Σ 2977.** Probably fixed. The angle in Σ appears to be too small.

1832.23	335°.1	2″.19	2*n*	Σ
1866.97	343.7	2.38	3*n*	Δ
1889.78	346.6	2.13	2*n*	Hl
1890.46	346.7	2.13	3*n*	HΣ
1900.27	343.9	2.06	3*n*	Doo
1902.73	342.6	2.03	1*n*	Hu

[Ma (*F. S.* **II**)...Ma (**X, XIII, XV**)...H (**IV**)...Δ (**II**)...Flm...Hl (**II**)...Doolittle (*Pub. Flower Obsy.* **I**)...HΣ (**XII**)...]

1 31 **12170.** **OΣ 488** *rej.* (= **Ho** 486). Rejected in *Poulkowa Catalogue* of 1850. Probably unchanged.

1884.84	333°.5	13″.94	2*n*	HΣ
1892.75	334.0	14.00	2*n*	Ho
1898.65	334.1	14.21	3*n*	Hu
1904.77	334.9	14.27	3*n*	Doo

[Ma (**XIII**)...Δ (**I**)...Ho (3234)...Hu (*Pub. L. O.* **V**)..HΣ (**XII**)...]

1 38 **12171.** **β 1025.** Discovered with the 18½-inch. There may be some change in the angle of the close pair.

A and B

1891.57	268°.6	0″.77	3*n*	β
1897.82	271.4	0.88	3*n*	A
1898.61	273.1	0.82	2*n*	β
1900.20	271.7	0.71	2*n*	Bowyer
1900.79	275.8	0.69	3*n*	Doo
1902.92	277.5	0.80	2*n*	Lewis

A and C

1891.57	84°.3	22″.16	3*n*	β
1898.29	83.9	21.96	3*n*	β
1900.78	84.2	21.25	2*n*	Doo
1902.88	86.4	22.58	1*n*	Lewis

[β (**XIII**)....$β^3$ (App)....β (3114)(*Pub. L. O.* **II**)....A (*A. J.* 429)....Bowyer and Lewis (*Mon. Not.* **LX**, 515; **LXI**, 486; **LXIII**, 403)....Doolittle (*Pub. Flower Obsy.* **II**)...]

1 38 **12172.** **Σ 2976.** No change in AB, but distance and angle of C increasing from the proper motion of one of the stars.

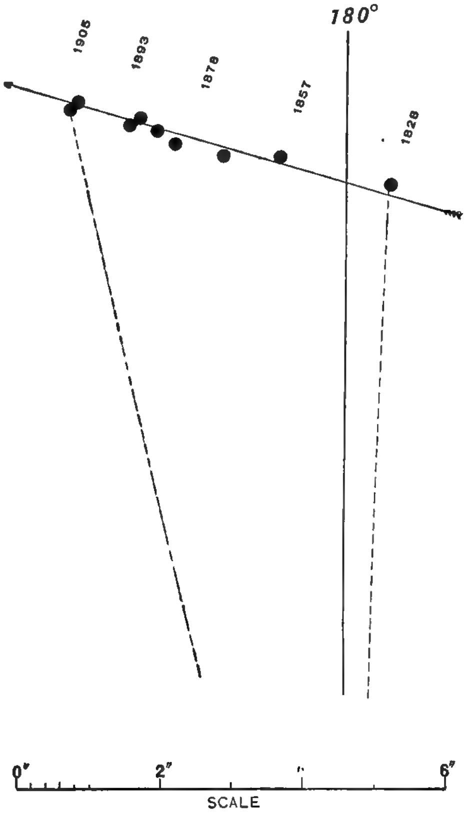
A and B

1887.85	264°.9	7″.79	1*n*	HΣ
1902.75	262.3	8.05	2*n*	Hu
1905.55	262.7	7.90	2*n*	β

A and C

1828.43	177°.7	15″.89	3*n*	Σ
1857.42	183.2	16.31	2*n*	Se
1867.60	186.0	16.41	4*n*	Δ
1878.21	188.3	16.66	2*n*	β
1884.09	189.0	16.88	3*n*	En
1887.86	189.7	17.10	2*n*	Hl
1893.74	190.2	17.02	2*n*	Gla
1902.75	192.3	17.51	2*n*	Hu
1905.55	192.8	17.44	2*n*	β

These measures give 0″.054 in 253°.1 for the most probable proper motion of C. If this movement is in A, the small star B has the same rate.



Σ 2976.

[Ma (*F. S.* **I**, pp. 63, 210)...Ma (**XI, XIII, XV**)...H (**V**)...Se. .OΣ (**IX**)...Δ (**II**)...Flm...WS...WS^2...Gl...Sk...Do (2199, 3681)(*Trans. R. I. Acad.* **XXIX**, Part 13)...$β^1$...Hl (**II**)...En (2678)...T (2899)...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...$β^6$...]

12173. **Σ 2978.** (= **♅** N. 11 = **Sh** 352). No change. $1^{m}\ 43^{s}$

1870.11	146°.3	8″.48	6*n*	Δ
1885.77	145.4	8.50	3*n*	Hl
1902.70	144.4	8.62	2*n*	Hu

[Ma (*F. S.* **I, II**)...Ma (**XI, XIII**)...H (**VII**)...Mh...Bp...J^2...Se...Se^3...Wr...Wr (*Phil. Trans.* 1851)...Ra (**XXI**)...Ba (**II**)...Flm...Δ (1209)...Δ (**I, II**)...WS...Gl...Sk...Du...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Hl (*Wash. Obsns.* 1885)...Hl (**I, II**)...Glasenapp (**III**)...Je (2450)...Chofardet (3450)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Sk^5...Bowyer (*Mon. Not.* **LXIV**, 806)...]

12176. **β 78.** Two distant companions noted with the 6-inch. The double distance, 34″.44, is given in $β^3$. Probably fixed. 2 9

A and B

1893.25	54°.9	18″.18	2*n*	Wilson
1898.51	54.7	18.22	2*n*	Doo

A and C

1893.25	62°.2	47″.28	2*n*	Wilson
1898.51	61.9	48.38	2*n*	Doo

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...β^3...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I**)...]

$2^m\ 9^s$ **12177.** **β 180.** Discovered with the 6-inch. Apparently unchanged. The other measures are:

A and B

1885.55	177°.5	0″.71	3*n*	HΣ
1888.95	177.5	0.55±	4*n*	Sp
1890.65	175.2	0.62	3*n*	β
1891.98	176.4	0.42±	1*n*	Sp
1898.49	171.8	0.82	2*n*	Doo

AB and C

1885.54	106°.8	34″.29	1*n*	HΣ
1890.65	106.6	34.43	3*n*	β
1898.49	106.6	34.84	2*n*	Doo

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59).. β (3048)(*Pub. L. O.* **II**)...Δ (2086)...Δ (I)...Sp (**III**)...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

2 10 **12178.** **Σ 2979.** Possibly a little change in the angle. The following are all the measures:

1831.92	218°.4	3″.09	4*n*	Σ
1847.71	218.4	2.88	1*n*	Ma
1865.86	220.5	3.02	3*n*	Δ
1894.66	224.7	3.37	2*n*	Gla
1904.96	225.6	3.19	1*n*	Furner
1905.61	223.5	2.98	2*n*	β

[Ma (*F. S.* **I**)...H (**IV**)...Δ (**II**)...Glasenapp (**III**)...Furner (*Mon. Not.* **LXVI**, 32)...β^6...]

2 10 **12179.** 4 *Andromedae.* **H 1849.** Probably fixed.

1879.57	345°.8	47″.25	1*n*	Cin	...12.0
1902.49	347.0	47.65	2*n*	β	...10.6

[Cin^6...Espin (*Mon. Not.* **LXII**, 533)...β^6...]

2 21 **12180.** **H 979.** These are all the observations:

1830.74	217°.5	16″.83	1*n*	H^1	8.9...10
1902.53	217.8	18.43	2*n*	β^6	8.5...10.2

"Distance the merest possible guess", H^1.

2 33 **12181.** **Ho 196.** Unchanged.

1894.80	293°.7	1″.58	2*n*	Ho
1901.99	291.2	1.79	4*n*	Doo

[Ho (2779, 3558)...]

2 42 **12182.** **Ho 620.** A later position is:

1902.72	98°.5	12″.00	4*n*	Doo

[Ho (3558)...]

12183. **Σ 2980.** Fixed. $2^m\ 58^s$

1866.39	111°.5	4″.41	3*n*	Δ
1892.83	111.8	4.43	3*n*	T
1904.67	110.2	4.28	3*n*	β

[Ma (*F. S.* **I, II**)...Δ (**II**)...LM...Cin^4...β^1...T (3186)...β^6...]

12184. **Σ 2984.** The principal star has a proper motion of 0″.068 in 147°.8 (Schroeter). No relative change. 2 58

1868.91	294°.6	4″.24	4*n*	Δ
1894.65	293.0	4.57	2*n*	Gla
1902.73	293.8	4.52	1*n*	Hu

[Ma (*F. S.* **I**)....Ma (**X, XI**)....H (**V**)....Wr....Δ (**II**)....Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Glasenapp (**III**)...]

12185. **Σ 2981.** Fixed. 3 13

1867.90	114°.2	3″.69	4*n*	Δ
1892.82	114.9	3.76	2*n*	T
1902.73	113.9	3.69	1*n*	Hu

[Ma (*F. S.* **I**)....Ma (**X, XI, XIII, XV** ?)....Hd....Se....Δ (**II**). ..Cin^4...LM....*Annals Toulouse Obsy.* **III**...T (3186)...]

12186. **Ho 487.** A later measure: 3 26

1904.77	118°.1	17″.92	3*n*	Doo

[Ho (3234)...]

12187. **A 311.** No other measures. 3 26

[A (3784)(*Bul. L. O.* No. 16)...]

12188. 57 *Pegasi.* **Σ 2982.** (= **Ħ N. 16**). "Yellow: fine blue", H. The proper motion of 57 Pegasi is 0″.028 in 290°.5 (Auwers). No relative motion. 3 28

1866.15	197°.8	32″.81	3*n*	Δ
1877.78	199.2	32.48	1*n*	β
1894.70	197.7	32.43	2*n*	Gla
1904.60	198.3	32.89	3*n*	β

[Ma (*F. S.* **II**)...Ma (**XII**)...Δ (**II**)...H (**V**)...En (2678)...β^1...Glasenapp (**III**) β^6...]

12191. **Σ 2983** *rej.* The following is the only measure: 3 41

1904.59	273°.8	27″.74	2*n*	β^6	8.4...10.5

12192. **Hn 57.** A later measure: 3 49

1888.19	291°.0	2″.35	3*n*	Com

[β^4...Com (**VI**)...]

12193. **H 3174.** "Fine". Probably no change. The magnitude in SD is 8.8. 3 53

1879.74	17°.4	5″.47	1*n*	Cin^6	8.5...9.0
1902.56	19.1	5.92	2*n*	β^6	9.0...9.3

$3^m\ 59^s$ **12195.** Σ 2986. (= **H** 306). Fixed. *White: purple*, H.

1865.27	272°8	31″41	3*n*	Δ
1905.65	272.1	31.51	2*n*	β

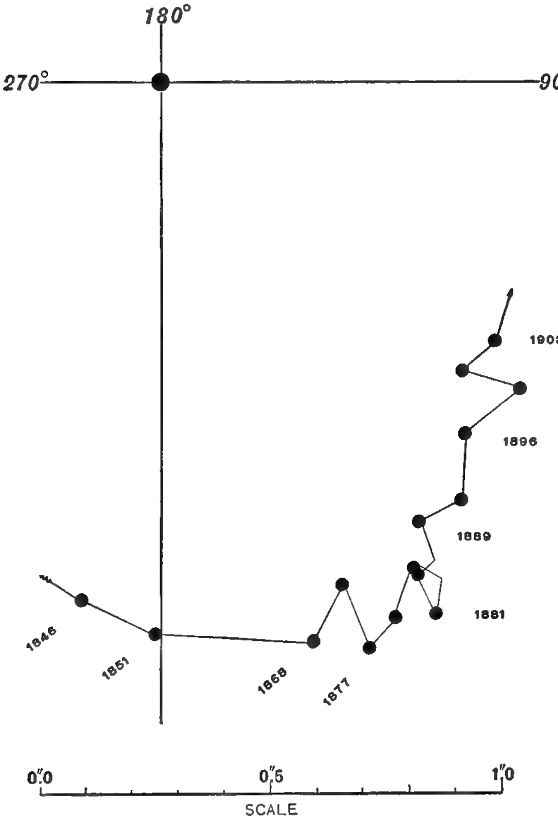
[Ma (*F. S.* **II**)...Δ (**II**)...Cin⁵...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**... β⁶...]

4 5 **12196.** *π Cephei.* **OΣ 489.** (AC = **H** 1852). The close pair makes a binary of long period. Glasenapp from measures to 1888 finds a period of 198.4 years, but the arc described, even at this time (1906), should be at least three times as great to give a good approximation to the period and other elements.

The proper motion is given from meridian observations:

Auwers	0″037 in 180°5
Newcomb	0.033 in 164.8

From observations at Mt. Hamilton, this star is recorded as a spectroscopic binary (Astrophysical Jour. XIV. 138).



π Cephei. OΣ 489.

1846.48	351°4	1″15	2*n*	OΣ
1851.42	358.5	1.21	2*n*	OΣ
1868.05	15.3	1.27	4*n*	Δ
1876.26	19.9	1.17	9*n*	Δ
1877.29	20.2	1.32	3*n*	OΣ
1878.66	23.8	1.28	1*n*	β
1879.43	27.5	1.20	14*n*	Hl
1881.68	27.3	1.31	3*n*	β
1885.89	27.4	1.22	4*n*	Hl
1889.42	30°9	1″19	3*n*	HΣ
1889.72	30.0	1.05	6*n*	Com
1892.63	35.8	1.13	2*n*	HΣ
1896.26	40.9	1.02	4*n*	Com
1901.99	49.5	1.04	3*n*	Doo
1902.80	46.3	0.92	2*n*	Hu
1903.77	52.2	0.93	2*n*	Biesbroeck

Herschel noted a 16m star, 12ˢ.5 *p* in the direction of 241°9, making H 1852. The only observation since is:

1906.29	240°6	58″76	2*n*	β⁶	...12.8

[OΣ (**IX, X**)...Δ (**I**, 214, 396)...Flm...WS...Kn...Gl...Sk...Sk³...Do (2322)... Glasenapp (*Orbites des Étoiles Doubles du Cat. de Poulkowa*, 1889)....Glasenapp (**I**)(2940)...Hl (*Wash. Obsns.* 1880, 1885)...Hl (**I**, p. 24, **II**)...Hl (*A. J.* 302)...β¹...β³...β⁴... En (2662)... de Ball (3017)...*Proc. Haverford Coll. Obsy.* 1891–2....Com (**VI, X**)....Sk⁴....Lv (*A. J.* 407)....Hu (*Pub. L. O.* **V**) (*Bul. L. O.* No. 40)....HΣ (**XII**).... Maw (**IV**).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...Biesbroeck...β⁶...]

12197. **H** 1851. Only this since H: $4^m\ 18^s$

1905.72	343°8	3″35	1*n*	β⁶	9.0...10.0

12198. **S** 825. (= **OΣ** (App 243). Fixed. 4 21

1876.30	319°4	66″34	3*n*	Δ	6.8...7.3
1904.60	319.4	66.34	2*n*	β	

There is a faint companion to B not previously seen:

1904.60	333°7	12″37	2*n*	β	...13.5

[Δ (**I**)...Franz (3080)...β⁶...]

12200. Σ 2985. (= **Sh** 353). Fixed. 4 26

1868.66	253°0	15″03	4*n*	Δ
1894.64	253.1	15.12	2*n*	Gla
1902.73	255.6	15.66	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...Wr...Ra (**XXIII**)...H (**IV**)...Du...Δ (1209) ...Δ (**I, II**)...Glasenapp (**III**)...Espin (*Mon. Not.* **LXIV**, 677)...]

12201. β 385. (AC = **H** 5532). Discovered with the 6-inch. Change is doubtful. 4 31

A and B

1880.77	128°9	0″51	1*n*	Perry
1882.62	131.4	0.50	1*n*	OΣ
1885.46	143.2	0.41	4*n*	En
1885.73	131.2	0.54	2*n*	HΣ
1888.69	132.3	0.4±	8*n*	Sp
1890.68	130.4	0.46	3*n*	β
1903.62	127.8	0.48	2*n*	Doo

AB and C (= H 5532)

1882.62	77°5	57″81	1*n*	OΣ
1885.71	77.1	57.93	1*n*	HΣ
1886.01	77.4	58.15	2*n*	En
1890.68	77.3	58.03	3*n*	β

[β (**VI**)...β (2062, 3048)(*Pub. L. O.* **II**)...Δ (**I**)...Perry (*Eng. Mech.* **XXXV**, 65; **XXXIX**, 11)... Big...OΣ (**X**)... En (2786)... Sp (**III**)... HΣ (**XII**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

4^m 37^s **12202.** 2 *Cassiopeiae.* **S** 823. (= ♅ **VI.** 55 = σ 772). No change. B is DM (58°) 2553. The proper motion of A is small:

	Auwers	0″.005 in 173°.6			
	Davis	0.009 in 175.0			
1881.65	163°.2	167″.85	3*n*	β	6.2... 8.3
1904.60	163.0	167.35	2*n*	β	

There are many small stars nearer A. The nearest is:

1904.60	321°.7	19″.88	2*n*	β	...13.5

[β⁴...Davis (*A. J.* 344)...β⁶...]

4 49 **12204.** **Σ** 2987. Probably a decrease in the angle.

1868.44	164°.7	3″.54	4*n*	Δ
1878.47	164.4	3.68	1*n*	β
1901.76	159.0	3.60	2*n*	Espin
1905.74	160.5	3.71	2*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...β¹...Espin (*Mon. Not.* **LXII**, 530)...β⁶...]

4 51 **12205.** **β** 852. *Pegasi* 306. Discovered with the 15½-inch of the Washburn Observatory. Lalande 45362. All the later measures are given.

A and BC

1881.80	283°.3	58″.25	2*n*	Ho
1886.86	283.0	58.32	1*n*	UL
1887.80	283.1	58.62	3*n*	Com
1898.83	282.9	58.75	3*n*	A

B and C

1881.79	10°.0	1″.47	2*n*	Ho
1886.86	10.6	1.24	1*n*	UL
1888.21	9.9	1.66	3*n*	Com
1898.84	5.3	1.49	3*n*	A

Aitken measures a 14m star from BC, 207°.8: 18″.0 (1898.87) 1*n.*

[β (**XII**)...β⁴...Ho (2978)...UL...Com (**VI**)...A (3585)...]

4 53 **12206.** **A** 786. With other measures (*Bul. L. O.* No. 61):

1904.56	150°.0	1″.40	3*n*	A	8.6...11.8

4 57 **12207.** **OΣ** 490. Probably unchanged, but later observers make the angle less.

1869.41	303°.2	1″.56	5*n*	Δ
1889.26	301.6	1.55	2*n*	Hl
1898.65	302.7	1.32	3*n*	Hu
1901.75	300.2	1.46	3*n*	Doo

[Ma (**XI, XIII**)....OΣ (**IX**)....Flm....Do (2330)....En (2742)....Δ (**I**)....Hl (**II**)....Big (*Bul. Ast.* **XII**, 299)....Hu (*Pub. L. O.* **V**)....Doolittle (*Pub. Flower Obsy.* **II**)...]

5 ± **12208.** ♅ **N.** 88. "Unidentifiable". The description in ♅ is, "double between 87 and 90 *Aquarii.*"

12209. **H** 1853. The place agrees with that of DM (44°) 4349, but the companion to that has a different position-angle: 5^m 4^s

1905.59	190°.9	33″.23	1*n*	β⁶	9.0... 9.7

The 7.3m star, DM (44°) 4347, which is 1^m 19^s *p* and 15′.8 *n* of the other, is perhaps more likely to be the one observed by Herschel.

1905.59	281°.3	31″.41	1*n*	β⁶	7.6...10.8

No other measures of either pair.

12210. **H** 980. "Small star double". For BC H (V) gives, 196°.3 : 7″ ± : 12...13, and suggests change. Examined with the 6-inch (1873), and angle of BC about 10° more than AB. A is about 8m. The 9.4-inch at Hanover showed a nearer companion to A, 120° : 40″ (1876). BC is given in Cin⁵. 200°.4 : 6″ ± (1879.64) 1 n. Recently measured: 5 8

AB	1902.49	184°.1	73″.45	2*n*	β⁶	7.0...
BC	1902.49	199.7	9.12	2*n*	β⁶	10.7...11.3

12213. **Σ** 2988. *Aquarii* 284. (= **S** 824). Fixed. 5 43

1866.37	280°.2	3″.41	3*n*	Δ
1902.69	279.6	3.57	2*n*	Hu
1903.82	279.2	3.60	5*n*	Jouffray

[Ma (*F. S.* **I**)....Ma (**X**)....H (**V**)....H³....WJ....Se....Se³....Ra (**XXIV**)....Δ (*Mem. Accad. Sci.*)...Δ (1036)...Δ (**I, II**)...Cin⁴...LM...Wilson (Cin¹⁰)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**)...Scott (*Brit. Ast. Ass'n.* **VI**, 368)...Maw (**III**)...*Annals Toulouse Obsy.* **III**...Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

12214. **Ho** 197. No evidence of change. 5 44

1894.79	104°.4	0″.35	1*n*	Ho
1902.70	103.1	0.43	3*n*	Doo

Hough measures two distant stars:

1894.79	329°.5	42″.56	1*n*	...8.5
1894.79	281.3	47.30	1*n*	...8.5

[Ho (2779, 3558)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12216. **A. G.** 290. Noted as double in *A. G. Chris.* No motion. 6 11

1898.46	264°.7	15″.19	3*n*	Doo
1902.50	265.2	14.85	4*n*	β

[β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...β⁵...β⁶...]

12217. **H** 1855. Not in DM. 6 18

1891.05	292°.1	4″.54	2*n*	β⁵	10...10

12218. **Hn** 170. No other measures. 6 24

[Hn (*Pub. Washburn Obsy.* **II**)...Com (**VI**)...]

12219. **See** 479. Other measures: 6 39

1898.36	53°.5	11″.54	5*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

6m 40s **12220.** **A** 197. No other measures.

[A (3741)(*Bul. L. O.* No. 3)...]

6 52 **12222.** **H** 3176. The only measure is:

1905.58	164°6	26″77	1*n*	β^{6}	9.2...9.2

H 3177 (No. 11223) is probably the same pair with error of 2° in the declination. Nothing found in that place.

7 8 **12224.** **OΣ** 492. Apparently fixed.

1867.86	232°4	8″83	3*n*	Δ
1899.09	230.7	9.07	3*n*	Hu

[OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

7 13 **12225.** **Σ** 2989. Without change.

1867.99	138°9	1″62	3*n*	Δ
1884.94	139.8	1.62	2*n*	Hl
1893.67	140.3	1.38	1*n*	Gla
1904.97	144.9	1.72	1*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**XI, XII, XIII**)...Flm... Δ (**II**)...Hl (*Wash. Obsns.* 1884)... Hl (**I, II**)....Glasenapp (**III**)....*Annals Toulouse Obsy.* **III**....Do (3931).... Bowyer (*Mon. Not.* **LXVI**, 32)...]

7 23 **12228.** **Σ** 2990. Motion doubtful. Some observers reverse the angle. The proper motion is 0″050 in 196°2 (*A. G. Berlin*).

1831.12	69°1	1″61	3*n*	Σ
1856.85	66.8	1.82	2*n*	Se
1868.47	65.7	1.78	4*n*	Δ
1870.32	65.5	2.16	2*n*	OΣ
1883.85	65.6	2.22	5*n*	En
1885.72	62.2	1.99	3*n*	Per
1893.66	63.3	1.85	2*n*	Gla
1904.59	63.5	2.10	3*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X**)...H^{1}...Se...OΣ (**IX**)...Δ (**II**)...Per...Per (2749)...En (2678)...Glasenapp (**III**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Bowyer (*Mon. Not.* **LXIV**, 806; **LXVI**, 32)...]

7 24 **12229.** **Σ** 2992. Fixed. The proper motion of the large star is 0″084 in 101°0 (Greenwich).

1865.03	284°8	14″06	3*n*	Δ
1889.66	286.7	13.87	1*n*	Gla
1902.73	285.8	14.45	1*n*	Hu
1905.95	284.8	14.07	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Glasenapp (**III**)...β^{6}...]

7 24 **12230.** **Σ** 2991 *rej.* Measures by β^{6}.

1902.85	358°7	33″72	Miller	7.2...9.7

7 31 **12231.** **β** 181. *Aquarii* 286. Discovered with the 6-inch. Probably unchanged. Lalande 45443. The other measures are:

A and B

1878.75	307°8	1″44	2*n*	Cin
1884.87	307.7	1.46	2*n*	Ho
1885.16	314.6	1.47	4*n*	W
1886.82	309.1	1.57	3*n*	LM
1888.77	305.3	1.31	1*n*	Lv
1892.68	308.8	1.63	3*n*	T
1898.86	311.6	1.45	1*n*	β

A and C

1878.75	237°1	19″24	2*n*	Cin	...12.2
1884.87	236.3	19.74	1*n*	Ho	...13
1898.90	239.1	19.18	3*n*	β	...11.4

[β (**III**)....β (*Mon. Not.* **XXXIV**, 59)....β^{1}....Δ (I)....Cin^{5}....Ho (2978)....Wilson (Cin^{10})...LM...Lv^{1}...T (3186)...]

12232. **OΣ** 491 *rej.* Excluded as single in second edition of *Poulkowa Catalogue*. Ma gave, 198°3:0″2± (1845.72) 1*n*. It was found to be single by Δ in 1867; by me in 1874 and 1877 with the 18½-inch, and by Hu with the 36-inch in 1899. It is probably not double. 7m 33s

[Ma (**XI, XIII**)...Δ (**I**, p. 230)...Hu (*Pub. L. O.* **V**)...]

12233. **A** 198. No other measures. 7 35

[A (3741)(*Bul. L. O.* No. 3)...]

12234. **Σ** 2993. (= **S** 826). No relative motion in these stars, but they have a common proper motion of 0″519 in the direction of 93°4 (Stumpe). The Paris Catalogue gives the proper motions: 7 47

A = 0″569 in 103°0
B = 0.550 in 90.0

As there has been no relative change, the motion must be the same.

1865.80	177°2	25″52	3*n*	Δ
1891.77	177.0	25.56	2*n*	Eng
1900.63	176.7	25.39	2*n*	β
1902.69	176.2	25.46	2*n*	Hu

There is a distant star not moving with the system:

1824.82	109°2	158″17	2*n*	S	...10
1891.76	113.7	129.72	2*n*	Eng	... 8.0
1900.61	114.5	126.07	3*n*	β	

These measures give for the proper motion of A 0″455 in 89°6.

[Ma (*F. S.* **I**)...Ma (**X**)...H^{3}...J^{2}...Ra (**XXV**)...OΣ (**IX**)...Δ (1209)...Δ (**I, II**)...Cin^{4}...Wilson (Cin^{10})...Glasenapp (**II**)...Engelhardt (**III**)...*Annals Toulouse Obsy.* **III**...β^{6}...]

12235. **A** 199. No other measures 7 48

[A (3741)(*Bul. L. O.* No. 3)...]

12236. **H** 981. Change in angle? 7 51

1830.	282°9	12″±	1*n*	H (V)	9–10...12
1905.76	263.4	22.98	1*n*	β^{6}	9.0 ...12.0

7^m 56^s **12237.** **β 714.** B.A.C. 8084. Discovered with the 18½-inch. The later observations show no certain change.

1878.77	153°.3	....	2*n*	Cin
1886.73	146.4	0″.48	2*n*	LM
1898.84	139.5	0.59	2*n*	A

[β (**X**)...β^1...Cin^4...Cin^6...LM...A (3585)...]

8 6 **12238.** **Ho 299.** A later position is:

1893.76	72°.5	0″.89	2*n*	Ho

[Ho (2977, 3234)...] (See p. 1086)

8 7 **12239.** **H 1857.** Nothing later but this:

1905.74	106°.7	22″.24	1*n*	β^6	9.0...10.0

8 25 **12242.** **β 715.** *Aquarii* 290. Lalande 45490. Discovered with the 18½-inch. The Cincinnati observers in 1879 thought the principal star was a close pair. This star was perfectly round with the 36-inch in 1891, and Leavenworth found it so in 1886. Boothroyd thought there might be an elongation in 280° (1898), but Doolittle found it single in 1901.

All the other measures are given.

1877.79	258°.0	3″.47	1*n*	Cin	7.0...11.0
1879.77	257.2	3.08	2*n*	Cin	6.0...11.5
1890.65	256.9	3.50	3*n*	β	6.6...11.7
1898.69	257.2	3.51	3*n*	Bd	6.8...13.2
1901.69	256.1	3.58	2*n*	Doo	6.2...11.2

[β (**X**)...β^1...β (3048)(*Pub. L. O.* **II**)...Cin^4...Cin^6...LM...Boothroyd (*A. J.* 478)...Doolittle (*Pub. Flower Obsy.* **II**)...]

8 28 **12243.** **H 1860.** These are all the measures:

1902.78	359°.6	6″.50	2*n*	β	9.0...10.5
1904.02	355.8	7.75	1*n*	Es	9.0...11.5
1905.74	358.6	6.50	2*n*	β	

There is a 13m star, 205°.2 : 18″.51 (1905.74).

[β^6...Espin (*Mon. Not.* **LXIV**, 679)...]

8 32 **12245.** **H 1859.** Nothing later but the following:

1905.60	121°.4	35″.18	2*n*	β^6	7.0...10.5

8 34 **12246.** **H 982.** The only measures are:

AC	1902.51	217°.7	45″.99	3*n*	β^6	7.5...11.8
AB	1902.54	175.5	41.22	2*n*	β^6	...12.2

There is a faint star near C.

8 35 **12247.** **H 983.** The only measure is:

1904.81	157°.7	16″.41	2*n*	Espin	8.8...9.5

[Espin (*Mon. Not.* **LXVI**, 143)...]

8 39 **12248.** **Σ 2996.** No material change.

1869.52	108°.0	4″.73	5*n*	Δ
1903.65	107.5	4.97	2*n*	Hu
1905.93	108.4	4.64	1*n*	β

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**V**)...Δ (**II**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Big...Glasenapp (**II**)...Cin^6...β^6...]

12249. **Hu 786.** With another measure the mean is: 8^m 41^s

1904.53	2°.7	0″.50	2*n*	Hu	9.2...9.8

[Hu (*Bul. L. O.* No. 65)...]

12250. **Hu 788.** With other measures the mean is: 8 42

1903.94	171°.7	0″.24	3*n*	Hu	9.2...9.8

[Hu (*Bul. L. O.* No. 65)...]

12251. **A 200.** No other measures. 9 0

[A (3741)(*Bul. L. O.* No. 3)...]

12252. **Hu 787.** The measures give: 9 3

1904.59	197°.0	0″.91	3*n*	Hu	8.8...9.5

[Hu (*Bul. L. O.* No. 65)...]

12253. **A 787.** With another measure the mean is: 9 5

1904.55	195°.1	2″.68	2*n*	A

[A (*Bul. L. O.* No. 61)...]

12254. **A. G. 291.** Double in *A. G Lund.* Measures by β^6. 9 14

12255. **β 716.** Discovered with the 18½-inch. It is 21^s *p* ψ^1 *Aquarii* (β 1220). This star is not in the SD. The other measures are: 9 15

1891.88	204°.1	1″.79	3*n*	β
1898.81	207.9	1.35	2*n*	Cg
1901.77	205.3	1.72	3*n*	Doo

[β (**X**)....β^1....β (3114)(*Pub. L. O.* **II**)....Cogshall (*A. J.* 478)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12256. **A 201.** No other measures. 9 26

[A (3741)(*Bul. L. O.* No. 3)...]

12257. ψ^1 *Aquarii.* **β 1220.** (AB = **Σ 12 App II** = **♅ IV. 12** = **S 827**). The duplicity of the Herschel companion was discovered with the 36-inch. It is a difficult pair, and beyond the reach of ordinary apertures. The large star has considerable proper motion: 9 36

Porter	0″.348 in 92°.1
Paris	0.378 in 72.6

The old companion is traveling at precisely the same rate, so that it is certain that ABC constitute a vast physical system. The two small stars, D and E, on the contrary, are strangers to the system, and are fixed in space, the change shown by the measures being due to the proper motion of the other stars.

B and C

1890.63	101°1	0″22	3*n*	β
1891.57	94.3	0.22	4*n*	β
1894.66	99.1	0.28	5*n*	Barnard
1898.84	94.8	0.39	4*n*	A
1899.93	97.5	0.46	1*n*	Hu
1902.64	102.6	0.42	2*n*	A
1903.67	103.0	0.45	3*n*	β
1903.75	102.3	0.46	3*n*	A

A and BC (= Σ 12 App. II)

1836.66	312°2	49″63	4*n*	Σ
1868.20	312.1	49.39	5*n*	Δ
1880.88	312.6	49.66	4*n*	β
1889.68	311.8	49.33	3*n*	β
1903.67	311.7	49.45	3*n*	β

A and D

1877.69	275°0	63″0	1*n*	β
1880.91	274.3	64.96	1*n*	β
1891.89	274.6	68.45	2*n*	β

BC and E

1877.69	34°9	18″4	1*n*	β
1891.89	16.7	19.25	2*n*	β
1898.98	9.2	18.26	1*n*	A

[β (**XVII**)...β (3047, 3114)(*Pub. L. O.* **II**)...β¹...β³...β (*Ast. Reg.* **XIX**, 41)... Barnard (*A. J.* 447)...A (3585)...Hu (*Bul. L. O.* No. 44)...β⁶...]

The following references include the measures of the Herschel star:

[H (**VIII**)...J²...Ra (**XXI, XXV**)...Eng (**II**)...OΣ (**X**)...Je (2407)...Glasenapp (**II**)...]

9^m 57^s **12260. See 481.** Other measures:

1898.70	141°9	2″92	3*n*	Cg	8.7...8.7

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

9 59 **12261. H 1862.** The only later observation is:

1902.59	235°1	17″63	2*n*	β⁶	8.5...9.7

10 21 **12262. Hu 789.** Measured since Part **I** was in type:

1904.59	182°0	1″94	3*n*	Hu	8.5...12.0

[Hu (*Bul. L. O.* No. 65)...]

10 24 **12265. Σ 2995.** Without change in the last forty years. The angle by Σ seems to be too small. A faint pair near this in Hd, 191°1 : 9″24 (1867.88); no magnitudes.

1866.34	30°3	4″63	3*n*	Δ
1890.29	30.0	4.74	3*n*	Giacomelli
1902.69	30.7	5.03	2*n*	Hu
1903.80	30.0	4.83	5*n*	Jouffray

[Ma (*F. S.* **I**)...Ma (**XI, XV**)...Se...Se²...Se³...Wr...Bp...Hd...Ra (**XXIII**)... Ba (**II**)...Δ (1036)...Δ (**I, II**)...Δ (*Mem. Accad. Sci.*)...Giacomelli (**III**)... WS...WS²...Pl...Gl...Cin⁴...Cin⁵...UL...Glasenapp (**II**)...Solá (3497)... Bryant and Lewis (*Mon. Not.* **LX**, 515; **LXIII**, 403)...*Annals Toulouse Obsy.* **III** ..Jouffray (*Bul. Ast.* **XXI**, 299)...Lau (*Bul. Ast.* **XXII**, 238)...]

10 27 **12267. H 3181.** The principal star has a proper motion of 0″101 in 90° (*A. G. Harvard*).

1902.65	19°3	22″29	2*n*	β⁶	9.1...10.0

12269. Weisse 39. "Duplex" in W¹. Not seen double in 1875. It is probable that Σ 2995 is the pair referred to. 10^m 32^s

12270. H 3182. This is the only measure: 10 34

1902.65	266°0	8″06	2*n*	β⁶	11.2...11.5

12273. β 992. Discovered with the 18½-inch. Retrograde motion. These are all the measures: 10 48

1880.59	170°5	0″41	5*n*	β
1890.64	161.5	0.34	3*n*	β
1894.20	157.1	0.23 ±	5*n*	Sp
1898.94	159.5	0.33	3*n*	A
1905.49	152.0	0.30	2*n*	A

[β (**XIII**)...β³...β (3048)(*Pub. L. O.* **II**)...Sp (**III**)...A (3639)...]

12274. β 182. Discovered with the 6-inch. It is the preceding star of a small equilateral triangle. This is undoubtedly a binary, and one of more than ordinary interest from the large proper motion of the system. 10 52

Porter	1″302	in	201°2
Romberg	1.297	in	200.4
Radcliffe	1.331	in	202.5

The following are all the measures:

1876.28	42°3	0″83	3*n*	Δ
1877.79	44.3	....	1*n*	Cin
1879.68	44.6	0.72	1*n*	Cin
1884.87	44.1	0.62	1*n*	Ho
1886.77	43.1	0.85	3*n*	LM
1888.77	45.4	0.74	2*n*	Lv
1891.59	48.8	0.63	3*n*	β
1892.63	45.4	0.79	2*n*	T
1898.66	48.0	0.58	2*n*	β
1901.16	42.3	0.58	2*n*	β
1901.73	46.9	0.63	2*n*	Doo

For the purpose of an independent determination of the proper motion, I have measured a 12.5m star:

AB and C

1898.66	79°9	68″04	2*n*	β
1899.75	78.5	68.66	3*n*	Barnard
1900.72	77.5	69.55	3*n*	β
1901.59	77.2	70.11	2*n*	β
1902.69	76.3	70.80	4*n*	β
1903.83	74.8	71.54	3*n*	β

The measures of C give for the most probable proper motion of AB:

1″306 in 199°0

AB and D

1902.69	169°6	155″61	4*n*	β

[β (**III**)...β (*Mon. Not.* **XXXIV**, 59)...β (3114)(*Pub. L. O.* **II**)...Δ (**I**)...Cin⁴... Cin⁵...Ho (2978)...LM...Lv¹...T (3186)...Doolittle (*Pub. Flower Obsy.* **II**) ...β⁵...β⁶...]

12275. Σ 2997. Without change. 11 4

1867.26	222°6	24″48	4*n*	Δ
1894.69	222.3	24.60	2*n*	Gla
1895.80	222.3	24.41	3*n*	Coleman

[Ma (*F. S.* **II**)...Δ (**II**)...Du...Glasenapp (**III**)...Coleman (*Mem. R. A. S.* **LIII**) ...*Annals Toulouse Obsy.* **III**...]

$11^{m}\ 24^{s}$ **12276.** **β** 79. Discovered with the 6-inch. A binary in slow retrograde movement, with a common proper motion of the components.

Stumpe	0″212 in 119°7
Porter	0.239 in 107.5
Paris	0.226 in 117.4

All the measures are given:

A and B

1876.35	115°3	1″03	4*n*	Δ
1877.81	114.3	....	1*n*	Cin
1879.64	108.5	0.81	2*n*	Cin
1886.63	102.4	1.02	2*n*	LM
1891.54	94.6	0.88	3*n*	β
1893.54	87.7	0.86	1*n*	Lv
1893.63	90.3	1.03	2*n*	Wilson
1893.95	94.0	0.82	4*n*	Sp
1894.64	90.7	1.01	4*n*	Barnard
1895.88	89.8	0.63	1*n*	Sp
1897.71	86.4	0.98	3*n*	A
1897.88	85.3	1.08	1*n*	Brown
1898.85	87.8	0.75	2*n*	β
1899.77	88.0	0.44	1*n*	Bowyer
1900.74	85.2	0.88	3*n*	A
1901.65	85.1	0.93	3*n*	Doo
1901.78	84.8	0.76	1*n*	A
1902.48	83.6	0.88	5*n*	Bryant
1902.92	87.0	0.97	1*n*	Lewis

AB and C

1900.79	161°1	16″20	1*n*	A

(β (**I**)...β (*Mon. Not.* **XXXIII**, 351)...β (3114)(*Pub. L. O.* **II**)...Δ (I)...Cin⁴...Cin⁵...LM...Lv (*A J.* 382)...Wilson ( )...Sp (**III**)...Barnard (*A. J.* 447)...A (*A. J.* 429)(*Bul. L. O.* No. 11)...Brown (3646)...Greenwich Obsy. (*Mon. Not.* **LX**, 515; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

11 32 **12277.** **Hu** 497. (AB = **Hn** 171 = **Ho** 198). The smaller component was found to be a close pair by Hussey in 1901. No other measures of this. There is no change in this with respect to A.

A and BC

1888.72	31°7	2″53	3*n*	Com
1894.76	32.0	2.05	2*n*	Ho
1901.76	34.4	2.46	1*n*	Hu
1902.70	31.5	2.43	3*n*	Doo

[Hn (*Pub. Washburn Obsy.* **II**)...Ho (2779, 3558)...Com (**VI**)...Hu (*Bul. L. O.* No. 21)...]

11 37 **12279.** **β** 853. Discovered with the 15½-inch at the Washburn Observatory. So far without change. The other measures are:

A and B

1888.37	224°5	0″55	3*n*	Com
1899.27	225.8	0.74	2*n*	A
1901.76	227.0	0.82	2*n*	Doo

AB and C

1888.00	69°8	6″74	2*n*	Com
1899.27	69.6	7.02	2*n*	A
1901.76	71.6	7.32	2*n*	Doo

[β (**XII**)...β⁴...Com (**VI**)...A (3639)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12281. **H** 3183. The only measures are: $11^{m}\ 43^{s}$

AB	1901.66	95°6	95″68	2*n*	β⁵	9.1...12.1
BC	1901.66	13.7	4.35	2*n*	β⁵	...12.1

12283. **Hu** 790. With another measure the mean is: 11 56

1904.55	303°4	1″06	2*n*	Hu	8.1...12.8

[Hu (*Bul. L. O.* No. 65)...]

12284. **H** 5393. No recent measures. 12 1

1878.72	305°0	19″12	2*n*	Cin	7.5...9.7

[Cin⁴...Cin⁵...Cin⁶...] (See p. 1086)

12285. 8 *Andromedae.* **β** 717. Discovered with the 18½-inch. The large star has a proper motion of 0″024 in the direction of 119°8 (Auwers). The measures appear to indicate a common movement of the components. The principal star is No. 267 of Schjellerup's *Catalogue of Red Stars.* The following are all the measures: 12 11

1878.88	161°4	7″55	4*n*	β
1885.61	159.8	7.84	1*n*	HΣ
1891.81	161.8	7.43	3*n*	β
1898.76	162.3	7.62	2*n*	β
1904.72	160.8	7.76	3*n*	β

[β (**X**)...β¹...β³...β (3114)(*Pub. L. O.* **II**)...HΣ (**XII**)...β⁶...]

12287. **Kr** 64. Noted as double in *A. G. Hels.* 12 14

1898.44	236°7	2″06	6*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12288. **Σ** 2999 *rej.* No early measures. 12 41

AB	1904.86	170°4	67″04	3*n*	β⁶	9.0... 9.0
BC	1904.86	169.2	18.61	3*n*	β⁶	...10.0
AD	1904.53	20.4	27.30	1*n*	β⁶	...12

12289. 95 *Aquarii.* **Ho** 199. For some reason this is a very difficult pair, considering the distance and magnitudes. It appears to be in slow retrograde motion. The proper motion is 0″023 in 70°1 (Auwers). The following are all the measures: 12 43

1884.85	223°5	1″15	1*n*	Ho	
1888.72	222.8	1.22	3*n*	β	...11.5
1889.85	222.7	....	1*n*	Ho	
1890.62	218.6	1.15	2*n*	β	...11.8
1899.76	213.9	1.32	3*n*	Hu	...11.5
1903.78	197.4	1.16	1*n*	β	...11.5
1905.69	199±	1±	1*n*	A	

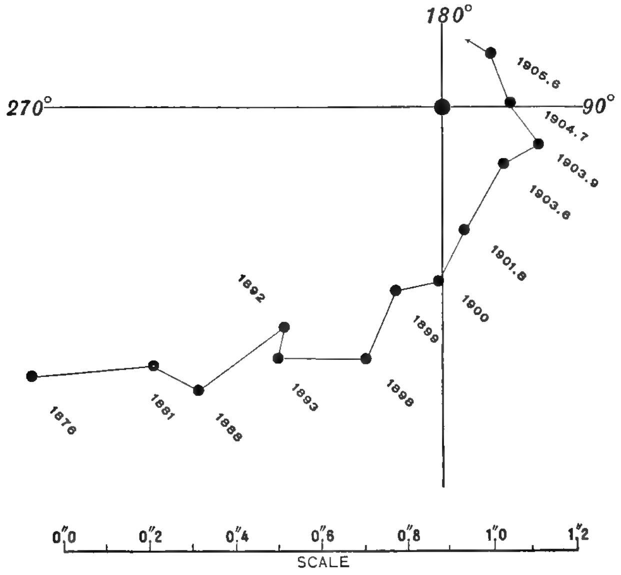
[Ho (2779, 3558).... β (2875, 3048)(*Pub. L. O.* **II**).... Hu (*Bul. L. O.* No. 44).... β⁶...] (See p. 1086)

$12^m\ 45^s$ **12290.** β 80. Discovered with the 6-inch. One of the most interesting binaries from the rapid relative motion, and the large movement of the system in space. The components have a large common proper motion:

Stumpe	0″.534 in 102°.3
Boss	0.509 in 101.2
Porter	0.480 in 100.5
Paris	0.520 in 103.6

The motion in position-angle has been very rapid in the last five years. Nothing can be certainly known as to the period until nearly one revolution has been completed, since the maximum separation in the fourth quadrant can only be determined by actual measures when the companion has reached that point in its orbit.

All the measures are given here:



β 80.

1875.80*	300°.4	1″.07	4*n*	Δ
1877.79*	306.1	1.24	2*n*	β
1881.69*	312.2	0.91	3*n*	β
1886.94	316.1	0.84	1*n*	LM
1888.71*	319.5	0.92	4*n*	β
1888.79*	319.5	0.84	3*n*	Lv
1891.57*	322.5	0.69	3*n*	β
1892.97*	327.2	0.60	3*n*	Sp
1893.54*	328.0	0.81	1*n*	Lv
1893.66*	329.1	0.85	3*n*	W
1893.96*	325.8	0.55±	3*n*	Sp
1894.84*	325.1	0.63	1*n*	Lewis
1898.76	347.8	0.56	1*n*	β
1898.78	330.0	0.60	1*n*	Bowyer
1898.78*	343.1	0.62	4*n*	A
1899.01*	341.7	0.48	2*n*	Bryant
1899.75*	350.3	0.42	2*n*	Bryant
1900.56*	2.8	0.41	2*n*	Doo
1900.75*	354.4	0.42	2*n*	A
1900.93	10.7	0.27	1*n*	Bryant
1901.79*	19°.6	0″.23	3*n*	Bryant
1901.84*	12.1	0.34	2*n*	Doo
1901.88*	9.6	0.32	2*n*	A
1902.75	39.3	0.29	1*n*	Bryant
1902.92	9.3	0.45	1*n*	Lewis
1903.65*	47.2	0.20	2*n*	A
1903.88*	63.5	0.23	2*n*	Bryant
1903.95*	72.9±	0.26±	1*n*	Biesbroeck
1904.73*	91.6	0.16	2*n*	A
1905.65	136.4	0.17	2*n*	A

The principal positions are shown on the diagram.

AB and C

1891.80	5°.3	103″.81	2*n*	Eng
1898.66	4.1	104.08	2*n*	β
1903.68	2.8	103.75	3*n*	β
1905.17	2.4	103.93	3*n*	β

AB and D

1891.80	333°.2	183″.57	2*n*	Eng
1898.66	332.4	186.36	2*n*	β
1903.68	331.9	187.22	3*n*	β
1904.55	331.8	187.69	1*n*	β

The measures of the two distant stars give 0″.433 in 98°.9 for the most probable proper motion of AB.

[β (I)...β (*Mon. Not.* **XXXIII**, 351)...β¹...β⁴...β (2875, 3114)(*Pub. L. O.* **II**)... Δ (I)...LM...Lv¹...Lv (*Sid. Mess.* **VIII**, 77)...Sp (**III**)...Lv (*A. J.* 382)... Wilson (°)....Engelhardt (III)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LX**, 515; **LXI**, 486; **LXII**, 383; **LXIV**, 806)...A (3585)(*Bul. L. O.* No. 11)(*Pub. A. S. P.* **XV**, 217)...Biesbroeck...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...β⁶...] (See p. 1086)

12292. 94 *Aquarii.* Σ 2998. (= **H** III. 34 = **Sh** 354). $12^m\ 47^s$ The components are relatively fixed, but have a common proper motion:

Stumpe	0″.281 in 108°.0
Auwers	0.283 in 109.4
Paris	0.302 in 108.5

1867.46	346°.3	13″.59	4*n*	Δ
1881.12	346.3	13.69	6*n*	Sp
1885.72	346.6	13.50	3*n*	Per
1887.86	346.6	13.55	2*n*	Hl
1902.73	347.5	13.39	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (324)...Ma (**XI**)...H³...H (**IV**)...WJ...WJ²...OΣ (**IX**)... Ra (**XXI**)....Flm....Δ (1196)....Δ (I, **II**)....Hd....Du....WS²....Sk²....Pt.... Cin³....Cin⁴....Sp (**II**)....Per....Per (2749)....Goldney (2257)....Hl (**II**).... Engelhardt (**II**)...Glasenapp (**II**)...Scott (*Brit. Ast. Ass'n.* **V**. 75)...Do (2316, 3378, 3799)...Solá (3563)...*Annals Toulouse Obsy.* **III**...Jouffray (*Bul. Ast.* **XXI**, 299)...]

12293. **A** 202. No other measures. 12 48

[A (3741)(*Bul. L. O.* No. 3)...]

12294. Σ 3000. No change. 12 50

1868.83	53°.4	3″.33	4*n*	Δ
1894.64	54.0	3.46	2*n*	Gla
1904.98	53.4	3.55	2*n*	Bowyer

[Ma (*F. S.* I)....Ma (**X, XI, XIII**)....Se....Δ (**II**)....UL....Glasenapp (**III**).... Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...Bowyer (*Mon. Not.* **LXVI**, 32)...]

13^{m} 10^{s} **12296.** 96 *Aquarii.* **H** 5394. The principal star has a considerable proper motion, and the companion appears to be moving with it.

Auwers	0″166 in 89°3
Paris	0.191 in 90.0

There is no sensible change in the position of the small star.

1869.76	23°5	9″88	3*n*	Δ	6.3...11.2
1878.62	23.1	10.08	1*n*	β	
1879.78	21.0	10.61	2*n*	Cin	...10.5
1896.94	21.7	10.60	2*n*	Hu	
1896.76	21.3	10.57	3*n*	Lv	
1896.94	19.9	10.16	2*n*	A	...12
1905.76	20.0	10.29	2*n*	β	

[Δ (I)...β¹...Cin⁴...Cin⁶. .Hu (*A. J.* 397)...Lv (*A. J.* 407)...A (3466)...β⁶...]

13 19 **12298.** **See** 482. Further measures give:

1898.82	94°8	14″35	3*n*	Boothroyd

[See (*A. J.* 431)...Boothroyd (*A. J.* 486)...]

13 22 **12299.** **OΣ** 493. No material change.

1867.54	26°9	8″23	4*n*	Δ
1889.82	25.6	8.42	2*n*	HΣ
1898.67	25.4	8.49	4*n*	Hu

The proper motion is 0″035 in 242°9 (Greenwich).

[OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

13 22 **12300.** **Σ** 3003. Very little change.

1868.18	268°7	23″08	4*n*	Δ
1893.00	268.1	22.64	2*n*	Gla
1902.62	268.7	22.88	2*n*	Hu

[Ma (*F. S.* **II**)...H (**V**)...Δ (**II**)...Cin⁶...Glasenapp (**II**)...]

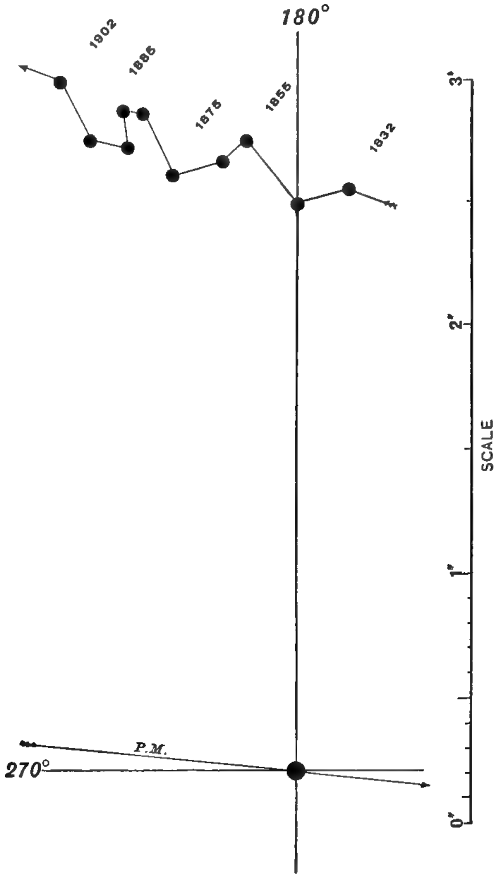
13 41 **12304.** *o Cephei.* **Σ** 3001. The components have a common proper motion:

Auwers	0″054 in 83°6
Schroeter	0.059 in 85.1

The movement of the companion is so far practically rectilinear, and in the same direction, implying a system of the 61 *Cygni* type.

1832.84	175°0	2″35	3*n*	Σ
1844.43	180.2	2.28	1*n*	Ma
1855.95	184.8	2.54	8*n*	Δ
1864.68	187.1	2.47	6*n*	Δ
1875.18	192.1	2.45	4*n*	Δ
1879.83	193.5	2.72	4*n*	Hl
1885.88	195°0	2″75	3*n*	Hl
1891.03	195.6	2.60	6*n*	HΣ
1902.62	198.6	2.68	3*n*	Hu
1902.90	199.3	2.94	2*n*	Do

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H (**IV**)...Mh...P¹...P²...J³...Wr... Da²....Se....Se²....Ra (**XXII, XXIX**)....Δ (1036, 1118, 1196, 1736, 2193).... Δ (*Mem. Accad. Sci.*)....Δ (I, II)....OΣ (**IX**)....Gl....WS....Sk....Flm.... Do (2199, 3799, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Big...Je (2450)... En (2678)...Hl (*Wash. Obsns.* 1885)... Hl (I, II)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (**II**) ... Collins (*A. J.* 378) ... HΣ (**XII**)... Maw (**IV**)...Thiele (3837)...Sk⁵...]



o Cephei. Σ 3001.

12305. **OΣ** (**App**) 244. The larger star has a proper motion of: 14^{m} 3^{s}

Stumpe	0″173 in 72°8
Paris	0.196 in 84.1
Porter	0.203 in 81.2
Greenwich	0.201 in 84.0

The change in the position of the companion corresponds to this movement. The following are all the measures:

1875.64	304°9	78″89	3*n*	Δ
1887.91	303.6	80.80	2*n*	Eng
1894.93	302.9	81.70	2*n*	Eng
1903.57	301	83.10	4*n*	β

These positions give 0″224 in 75°3 for the most probable value of the proper motion of A.

[Δ (I)...Franz (3080)...Engelhardt (**II, III**)...β⁶...]

$14^m\ 14^s.5$ **12307.** **H** VI. 61. Herschel's place is that of 7 *Piscium.* His description is, "they form a triangle, each side of which is about 1′," and speaks of it as near the bright star. I could not find anything here (1901) which could be satisfactorily identified.

[β5...]

14 27 **12308.** **β** 229. Discovered with the 6-inch. No change.

1888.69	36°.7	17″.93	2*n*	T
1898.99	36.7	17.75	4*n*	Doo

[β (IV)...β (*Mon. Not.* **XXXIV**, 382)...Δ (I)...T (2991)...Doolittle (*Pub. Flower Obsy.* I)...]

14 38 **12309.** **H** 3184. "A fine double star". The measures are very conflicting; probably no change.

1830+	281°.7	6″±	1*n*	H	
1869.89	102.6	10.96	1*n*	Hd	
1877.78	279.3	4.85	2*n*	Sp	
1877.78	282.1	5.63	3*n*	Cin	
1891.88	284.1	5.15	2*n*	β	8.1...9.6
1892.69	282.3	5.18	2*n*	Gla	7.0...8.8
1905.76	284.8	5.23	1*n*	β	

[Hd...Cin4...Sp (II)... Sp (2171) ... Glasenapp (II) ... β (3114)(*Pub. L. O.* II)... β6...]

14 41 **12310.** **H** 984. Nothing later but this:

1904.60	87°.3	17″.00	1*n*	β6	9.0...11.5

14 43 **12311.** **Ho** 488. (AB = **Σ** 3002). No change in AB. The close pair was discovered by Hough in 1890 with the 18½-inch. The following are all the other measures:

B and C

1891.56	214°.9	0″.80	3*n*	β	10.7...11.2
1894.84	213.5	0.89	1*n*	Lewis	

A and BC

1867.25	201°.9	4″.29	3*n*	Δ
1879.58	202.2	4.26	1*n*	Cin
1890.94	203.8	3.97	2*n*	Ho
1891.56	202.1	3.80	3*n*	β
1902.63	200.2	3.93	2*n*	Hu

[Ma (*F. S.* I)...Ma (XI)...H (IV)...Δ (II)...Cin5...Ho (3234)...β (3114)(*Pub. L. O.* II)...Lewis (*Mon. Not.* **LVI**, 359)...]

14 52 **12312.** **OΣ** 494. (= **H** 1869). Fixed.

1869.98	83°.0	3″.20	6*n*	Δ
1895.85	81.0	3.31	2*n*	Coleman
1898.55	82.5	3.33	4*n*	Hu

[Ma (XI) ... Da3 ... OΣ (IX) ... Δ (I)... Ba (I)...Du...WS...Glasenapp (III)... Coleman (*Mem. R. A. S.* **LIII**)...Knorre (3632)...Hu (*Pub. L. O.* V)...]

15 3 **12313.** **Σ** 3004. B. A. C. 8135. Fixed.

1867.24	179°.2	13″.09	4*n*	Δ
1905.69	177.7	13.15	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H (IV)...Δ (II)...Cin5...β6...]

15 13 **12314.** **H** 1870. The only measure is:

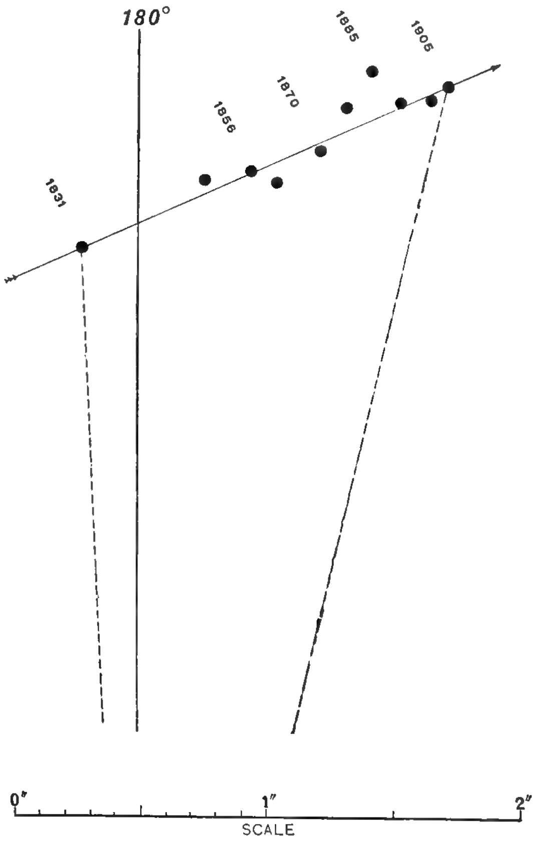
1905.49	293°.6	15″.57	1*n*	β6	8.2...11.8

12316. **β** 278. B. A. C. 8138. Discovered with the 9.4-inch at the Dartmouth College Observatory. Evidently an error of 180° in the measure of OΣ. The proper motion of this star is very small, 0″.015 in the direction of 247°.2 (Auwers). A naked-eye star in *Cassiopeia;* Heis 6m; Harvard photometry 6.3m. $15^m\ 20^s$

1876.45	351°.9	14″.76	1*n*	OΣ
1890.64	173.9	12.66	3*n*	β
1898.59	174.8	12.86	3*n*	β
1902.72	175.5	12.77	1*n*	Doo
1905.61	175.0	12.65	4*n*	β

[β (V)...β (*Mon. Not.* **XXXV**, 31)...β (3048)(*Pub. L. O.* II)...OΣ (X)...Doolittle (*Pub. Flower Obsy.* II)...β6...]

12317. **Σ** 3006. (= **S** 828). So far the motion is rectilinear with an annual rate of 0″.02. 15 24



Σ 3006.

1831.55	182°.8	4″.65	3*n*	Σ
1840.75	176.8	4.93	1*n*	Da
1856.88	174.7	4.98	2*n*	Wr
1864.92	173.5	4.94	7*n*	Δ
1870.20	171.6	5.09	5*n*	Du
1879.77	170.8	5.28	2*n*	Hl
1885.95	170.1	5.44	2*n*	Hl
1894.70	168.5	5.34	2*n*	Gla
1902.85	167.2	5.37	2*n*	Do
1905.93	166.8	5.44	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...H^1...H (**VII**)...Bp...Da^1...Da^3...Wr...Ba (**II, IV**)...Flm...Δ (1573)...Δ (**II**)...Gl...WS...WS^2...Sk...Pl...Do (2199, 2303, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Du...Hl (*Wash Obsns.* 1885)...Glasenapp (**III**)...Hl (**I, II**)...Collins (*A. J.* 378)...Coleman (*Mem. R. A. S.* **LIII**)...HΣ (**XII**)...Thiele (3837)...Sk^5...β^6...]

$15^m\ 36^s$ **12320.** **H** 3185. Described by H, 160° ± : 14...14 (1830); "a double with some nebulous appendage." A of the measures is a faint nebula (Dreyer 7634). No star was seen in the nebula.

1901.74	163°6	21″24	2*n*	β^6	...13.4

15 36 **12321.** Discovered by Espin.

AB	1905.66	82°6	36″99	1*n*	β	8.2...
BC	1905.66	76.0	6.12	1*n*	β	10.8...10.8

[Espin (*Mon. Not.* **LXIV**, 680)...β^6...]

15 37 **12322.** Σ 3005 *rej.* Measures from H (V).

1902.69	22°4	20″56	2*n*	Hu	
1905.93	24.0	20.38	2*n*	β^6	8.4...10.2

15 55 **12324½.** **A** 640. No other measures.

[A (*Bul. L. O.* No. 50)...]

16 3 **12325.** 64 *Pegasi.* **β** 718. Discovered with the 18½-inch. There is no material relative change, but the components have a common proper motion of 0″020 in the direction of 144°2 (Auwers), and therefore probably form a binary system.

1878.74	88°3	0″47	4*n*	β
1878.74	88.7	0.56	1*n*	Δ
1882.62	85.9	0.60	1*n*	OΣ
1884.72	86.5	0.73	2*n*	HΣ
1884.75	86.7	0.56	3*n*	Young
1888.73	85.8	0.63	3*n*	Sp
1888.80	85.4	0.67	4*n*	β
1889.50	86.2	0.69	3*n*	β
1899.26	86.8	0.59	2*n*	A

[β (**X**)...β^1...β^3...β (2875, 2957)(*Pub. L. O.* **II**)...Δ (**I**)...OΣ (**X**)...Sp (**III**)...A (3639)...HΣ (**XII**)...]

16 7 **12326.** **H** 310. In SD 8.8m. H (V) 328°5 : 14″: 9–10...10.

16 40 **12331.** 98 *Aquarii.* **Hd** 175. The 40-inch shows nothing but a very distant 11m star, 8°0 : 140″. The principal star has a proper motion of 0″170 in 241°6 (Paris).

[β^6...]

12332. Σ 3007. B. A. C. 8147. Change doubtful, but the stars have a common proper motion: $16^m\ 49^s$

Stumpe	0″309 in 93°1
Paris	0.337 in 90.0

In 1883 Engelmann suspected the principal star to be a close pair, but it was single with the 36-inch in 1891.

1829.83	79°2	5″69	3*n*	Σ
1851.80	82.9	6.13	1*n*	Σ
1866.94	79.7	5.98	4*n*	Δ
1869.79	83.3	6.12	3*n*	OΣ
1883.29	79.6	6.20	7*n*	En
1885.72	79.2	6.28	3*n*	Per
1894.90	81.6	5.97	3*n*	Maw
1905.56	81.8	6.05	2*n*	β

There is a distant star first measured by Engelhardt:

1894.89	321°9	75″85	2*n*	Eng
1905.56	320.0	77.52	2*n*	β

These positions give for the proper motion of A, 0″285 in 84°2.

[Ma (*F. S.* I)...Ma (**XI, XII, XIII, XV**)...Se...OΣ (**IX**)...Δ (**II**)...Per...Per (2749)...En (2678)...Engelhardt (**III**)...Maw (**II**)...β (3114)(*Pub. L. O.* **II**)...Collins (*A. J.* 378)...*Annals Toulouse Obsy.* **III**...Do (3931)...β^6...]

12333. **H** 1873. The only measure is: 16 46

1904.63	55°4	7″85	2*n*	β^6	8.4...10.4

12335. 66 *Pegasi.* **Ho** 300. On three nights, 1886 to 1889, Hough thought this was a close pair; but on two nights in 1890 and 1891 it was perfectly round with the 36-inch, and so Hussey found it with the same instrument in 1897. This star has a proper motion of 0″026 in 189°6 (Auwers). 17 1

[Ho (2977)...β (3048, 3114)(*Pub. L. O.* **II**)...Hu (*A. J.* 427)...]

12336. **H** 3188. The only measure is: 17 8

1905.59	247°5	20″88	1*n*	β^6	9.0...11.5

12337. **H** 3189. B. A. C. 8152. "*Yellow : bluish.*" 17 23

1879.74	133°2	41″47	1*n*	Cin^6	
1905.57	136.8	41.67	2*n*	β^6	7.0...11.0

12338. **H** 5397. Measures by H^3. Change in distance? 17 24

1892.84	335°2	64″84	2*n*	Gla	7.0...8.3
1905.57	336.6	65.04	2*n*	β	

[H^3...Glasenapp (**II**)...β^6...]

12339. **H** 3191. The only measure: 17 25

1905.47	47°6	45″81	1*n*	β^6	9.0...11.3

$17^m\ 32^s$ **12340.** Σ 3008. (= H N. 112 = S 829). Rectilinear motion. The following positions are shown on the diagram:

1830.89	273°3	7″54	3*n*	Σ
1843.76	269.5	6.96	2*n*	Ma
1856.87	265.6	6.12	4*n*	Se
1863.08	262.9	5.57	6*n*	Δ
1869.55	260.2	5.13	4*n*	Δ
1876.95	256.4	4.80	5*n*	Δ
1879.76	254.7	4.93	3*n*	Hl
1880.95	255.5	4.65	4*n*	Sp
1884.94	252.3	4.64	2*n*	Hl
1893.82	243.4	4.24	2*n*	Maw
1902.62	237.6	3.79	2*n*	Hu
1903.72	237.1	3.89	2*n*	Scott
1905.57	236.6	3.62	3*n*	β

The foregoing measures give for the most probable value of the proper motion of A:

0″066 in 294°6

A pair in Hd "near Σ 3008", 194°4 : 34″09 (1867.92) 1 n; no magnitudes given. There is a wide pair of small stars closely following Σ 3008 which is probably the one referred to. The approximate relation now is, 204°4 : 37″2 (1905).

12343. Σ 3010. Relatively fixed, but common proper motion: $17^m\ 45^s$

Stumpe	0″172 in 95°0
Argelander	0.191 in 93.0
Kustner	0.167 in 98.2

1866.19	132°0	25″73	3*n*	Δ
1894.04	131.1	25.44	2*n*	Eng
1905.71	132.1	25.77	2*n*	β

Espin measures a faint star:

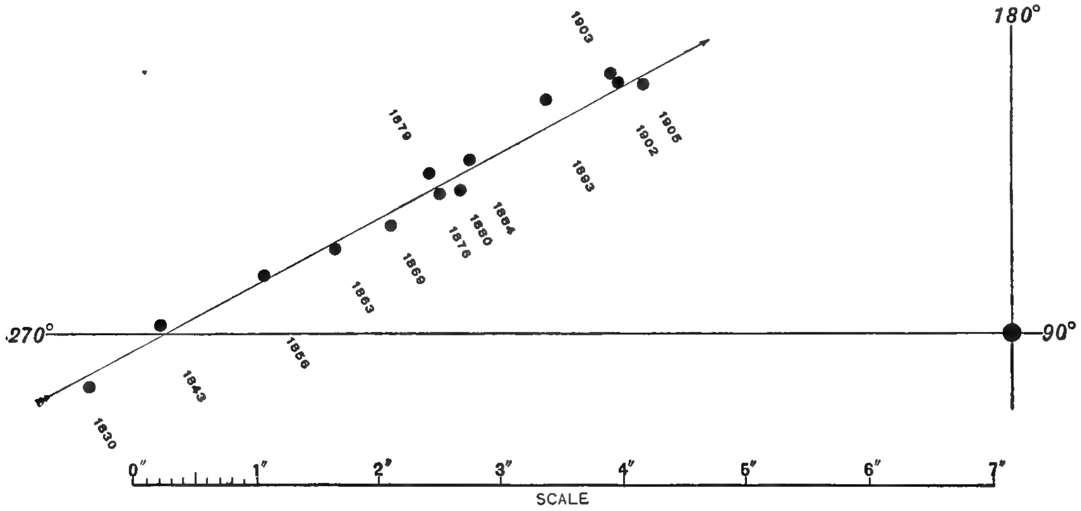
BC	1901.71	103°6	29″47	2*n*	Es	...11.5
	1905.71	104.8	29.02	2*n*	β	...12.2

[Ma (*F. S.* **II**)...Δ (**II**)...Cin⁵...Engelhardt (**III**)...Glasenapp (**V**)...Espin (*Mon. Not.* **LXII**, 530)...β⁶...]

12344. Σ 3009. Without change. 18 9

1865.29	230°9	6″97	3*n*	Δ
1897.82	227.5	7.08	3*n*	Coleman
1902.63	230.2	6.97	2*n*	Hu

[Ma (*F. S.* **I**)....Ma (**XI**)....H (**V**)....Se....Ferr....Δ (**II**)....Glasenapp (**II**).... *Annals Toulouse Obsy.* **III**... Coleman (*Mem. R. A. S.* **LIV**)...]



Σ 3008.

[Ma (*F. S.* **I**)...Ma (**XI, XIII, XV**)...H¹...H²...H³...H (**VIII**)...Wr...Se... Se²...Se³...P²...Bp...Flm...Hd...Ba (**II**)...Ra (**XXI, XXVIII, XXIX, XXX, XXXII, XXXVI, XLV**)....Do (2199, 3378, 3799)(*Trans.R. I. Acad.* **XXIX**, Part 13)...Δ (1196, 1475, 1736, 2081)...Δ (I, II)...Ferr...Pl...Pt...WS...Gl... Sk...Sk³...Sp (**II**)...T (2899)...Cin³...Cin⁴...Cin⁵...Cin⁶...Wilson (Cin¹⁰) ...Lv¹...Glasenapp (**II**)...*Proc. Haverford Coll. Obsy.* 1891–2...Hl (*Wash. Obsns.* 1884, 1886)... Scott (*Brit. Ast. Ass'n.* **V**, 75)(*Mon. Not.* **LXIV**, 52)... Maw (**II**)...Collins (*A. J.* 378)...Solá (3497)...*Annals Toulouse Obsy.* **III**... Biesbroeck...β⁶...]

17 38 **12341.** H 1874. "Great scarcity of double stars in this part of the heavens."

17 38 **12342.** Howe 63. Discovered at the Cincinnati Observatory.

1897.12	266°9	6″67	3*n*	See	7.5...11.0

[Cin⁴...See (3496)...]

12345. β 854. Discovered with the 15½-inch at the Washburn Observatory. Apparently without change. 18 14

1886.86	89°7	2″44	5*n*	UL	
1887.70	87.9	2.38	3*n*	Com	8.4...8.6
1888.82	88.3	1.89	1*n*	Lv	8.5...8.5
1899.32	88.3	2.47	6*n*	Doo	8.9...9.0

[β (**XII**)....β⁴....UL....Com (**VI**)....Lv¹. ..Doolittle (*Pub. Flower Obsy.* **I**)....]

12346. β 719. (= Ho 301.) Discovered with the 18½-inch. In an unequal pair of this class, the apparent change in angle needs confirming. In my *Tenth Catalogue* this star was erroneously identified as W¹ XXIII. 363, and given with an error of 1° 11′ in the Declination. It was found independently by Hough. All the measures are given: 18 22

1877.86	10°9	1″11	1*n*	β
1887.79	8.3	1.31	2*n*	Ho
1891.60	3.6	1.34	3*n*	β
1895.71	354.6	1.27	1*n*	Ho
1897.83	358.8	1.47	1*n*	Brown
1899.72	2.2	1.46	2*n*	Doo
1901.75	351.2	1.49	4*n*	Doo
1902.91	5.2	1.27	1*n*	Lewis

[β (**X**).... β^1.... β (3114)(*Pub. L. O.* **II**).... Ho (2977, 3558).... Brown (3646).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* I, II).... Lewis (*Mon. Not.* **LXIII**, 403)...]

$18^m\ 41^s$ **12348. OΣ 495.** Very little change.

1869.26	137°9	Obl.	6*n*	Δ
1889.43	127.1	0″36±	3*n*	HΣ
1898.28	127.7	0.32	6*n*	Hu

The proper motion is given:

A. G. Hels.	0″033	in	90°0
Greenwich	0.032	in	108.3

[Ma (**XI**)....OΣ (**IX**)....Δ (**I**)....En (2678)....Do (3681)....Hu (*A. J.* 427)(*Pub. L. O.* **V**)...HΣ (**XII**)...]

18 42: **12349. H VI. 25.** (= σ 779). Called 3 *Cassiopeiae* by H, but it is noted in the B.A.C. that this star does not exist. There is no bright star in this place (1876), and there is no doubt that the star observed by H is P XXIII. 100 (See No. 12405).

18 45 **12350. A 788.** No other measures.

[A (*Bul. L. O.* No. 61)...]

19 22 **12352. A 789.** With later measures the mean is:

1904.56	79°9	1″58	3*n*	A	8.5...9.2

[A (*Bul. L. O.* No. 61)...]

19 30 **12354.** 4 *Cassiopeiae.* **H VI. 24.** (= σ 780). The principal star has a proper motion of 0″017 in 158°1 (Auwers). The following are all the measures:

AB	1879.47	226°2	98″13	1*n*	β^3	6.0... 8.5
	1903.66	226.5	97.61	4*n*	β^6	
AC	1879.47	258.3	214.35	1*n*	β^3	
CD	1879.47	35.3	10.30	1*n*	β^3	9.5...10.5

19 35 **12356. Σ 3011.** No change.

1866.58	333°8	6″94	3*n*	Δ
1894.65	332.7	6.72	2*n*	Gla
1902.62	332.2	6.86	2*n*	Hu

[Ma (*F. S.* **I**)...Wr...Δ (**II**)...Cin^6...Glasenapp (**III**)...Lau (4078)...]

19 40 **12357. See 484 (= See 486).** Other measures are:

AB	1899.65	55°5	1″26	3*n*	Cg
AC	1899.65	144.5	22.68	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

12359. A. G. 292. Double in *A. G. Leiden.* Measures by β^6 $19^m\ 46^s$

1904.78	230°5	3″05	3*n*	Es	8.8...10.2

[β^6...Espin (*Mon. Not.* **LXVI**, 144)...]

12360. Hd 176. These are all the complete later measures: 19 55

1882.65	52°9	5″31	2*n*	W	8.5...9.0
1896.83	52.4	4.61	2*n*	See	9.0...9.2
1903.78	51.9	4.85	2*n*	β	8.7...9.0

[Hd...Cin^6...Wilson (Cin^{10})...See (3496)...β^6...]

12361. H 3193. Nothing later but this: 20 2

1892.84	216°1	33″87	2*n*	Gla	9.5...10.0

[Glasenapp (**II**)...]

12362. H 1876. "Fine". All the measures are given. 20 2

1879.57	210°4	8″92	1*n*	Cin	10.0...10.5
1900.71	211.6	10.12	1*n*	Es	9.4... 9.6
1904.62	211.7	9.20	2*n*	β	8.6... 9.7

[Cin^5...Espin (*Mon. Not.* **LXIV**, 679)...β^6...]

12363. Ho 489. (AC = **OΣ (App) 245**). Close pair discovered by Hough with the 18½-inch. The only measures are: 20 4

A and B

1889.85	241°2	0″44	2*n*	Ho
1893.76	253.8	0.43	2*n*	Ho

No change in the distant star.

AB and C

1893.73	194°2	62″89	1*n*	Ho
1905.83	194.8	62.94	1*n*	β

[Δ (**I**)...Ho (3234)...Franz (3464)...β^6...]

12365. H 1877. "The place is that of a beautiful planetary nebula close to the double star". This is the planetary nebula, Dreyer 7662. Herschel's angle of 58°5 is the direction of A from the nebula. This has been measured by several early observers (see *Pub. L. O.* II, p. 167). 20 6

A and B

1905.72	359°3	21″15	1*n*	β	12.0...13.5

A and nebula

1890.78	242°9	51″84	2*n*	β	13.0...
1905.72	242.3	52.31	1*n*	β	

[β (*Mon. Not.* **LII**, 46)(*Pub. L. O.* **II**, p. 167)...β^6...]

12366. See 485. A later position: 20 16

1899.65	134°6	5″14	3*n*	Cg	6.7...12.7

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

12367. A 790. No other measures. 20 17

[A (*Bul. L. O.* No. 61)...]

$20^{m}\ 46^{s}$ **12369.** *κ Piscium.* **S 830.** (= ♅ VI. 62 = σ 782). The 18½-inch shows a faint star between. The change since South is obviously due to proper motion. This is given:

Auwers	0″.109 in 144°.7	
A. G. Nico.	0.119 in 148.9	
Measures of B	0.169 in 152.0	

The last value is from the following measures of the small star:

1877.78	344°.7	156″.22	1*n*	β	
1887.86	345.1	158.47	2*n*	Eng	5.0...10.6
1894.85	344.4	159.25	2*n*	Eng	
1904.54	344.5	160.75	2*n*	β	

[β¹... Engelhardt (**II, III**)...β⁶...]

21 5 **12371.** **Weisse 40.** "Duplex" in W¹. I did not find any double here in 1876. This star has a proper motion of 0″.034 in 132°.0 (*A. G. Nico.*). A recent examination with the 40-inch (1904) shows no companion.

21 13 **12372.** **β 386.** B. A. C. 8173. Discovered with the 6-inch. The companion seems to be moving in space with the other. The proper motion of A from meridian positions is given:

A. G. Chris.	0″.026 in 96°.7
Battermann	0.013 in 40.9
Schroeter	0.026 in 57.0

1876.97	312°.3	20″.08	4*n*	Δ
1888.71	313.1	20.69	3*n*	β
1899.05	313.0	19.94	3*n*	Doo

[β (**VI**)....β (2062, 2875)(*Pub. L. O.* **II**)....Δ (**I**)....Doolittle (*Pub. Flower Obsy.* **I**)...]

21 16 **12373.** **H 986.** The only measure is:

1905.72	285°.2	10″.83	1*n*	β⁶	10.0...11.0

21 23 **12377.** **O. Stone 59.** Unchanged.

1885.29	220°.0	1″.45	2*n*	Wilson
1897.63	218.2	1.76	1*n*	See

[Cin³...Cin⁴...Wilson (Cin¹⁰)...LM...See (3496)...]

21 34 **12378.** **Σ 3012 and Σ 3013.** Fixed. The largest star A¹, has a small proper motion, 0″.058 in 99°.8 (*A. G. Berlin*).

A and B (= Σ 3012)

1866.86	189°.7	2″.65	3*n*	Δ
1892.84	188.9	2.68	2*n*	Gla
1902.62	191.2	2.84	2*n*	Hu

A¹ and B¹ (= Σ 3013)

1866.85	271°.1	2″.75	4*n*	Δ
1892.82	270.7	2.78	3*n*	Gla
1902.62	272.6	3.05	2*n*	Hu

A and A¹

1867.55	246°.2	52″.13	3*n*	Δ
1902.62	246.3	52.43	2*n*	Hu

[Ma (*F. S.* **I** 41, 64)...Ma (**X, XI, XIII**)...Se...Δ (**II**)...Cin⁵...Glasenapp (**II**)... A (*Ast. Soc. Pac.* **VII.** 305)....*Annals Toulouse Obsy.* **III**.... Maw (**IV**).... Bowyer (*Mon. Not.* **LXIV**, 806; **LXVI**, 32)...]

$21^{m}\ 35^{s}$ **12380.** **H 1881.** The only measure is:

1905.72	71°.0	16″.20	1*n*	β⁶	9.0...12.0

21 52 **12381.** **Σ 3014.** Distance increasing?

1865.50	279°.3	7″.41	3*n*	Δ
1893.74	279.6	7.71	2*n*	Gla
1902.63	280.0	7.86	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...Δ (**II**)...Cin⁵...Glasenapp (**III**)...*A. G. Leipzig* p. 211...]

21 58 **12384.** **OΣ (App) 246.** B is W² XXIII. 439. The proper motion of both stars is given by Rechenberg:

A = 0″.067 in 115°.5
B = 0.020 in 310.5

The following are all the measures:

1875.43	112°.3	89″.43	3*n*	Δ
1891.50	113.1	88.00	4*n*	Franz
1903.53	114.0	87.20	3*n*	β

These measures give for the proper motion of A, considering B as fixed:

0″.122 in 116°.0

Therefore if the value given from meridian observations of the motion of A is correct, the proper motion of B is:

0″.055 in 296°.6

[Δ (**I**)...Franz (3464)...Rechenberg (3482)...β⁶...]

22 2 **12385.** **β 1148.** Discovered with the 36-inch. In DM 6.5 m.

1898.68	77°.3	2″.47	1*n*	A	6.5...13.0

The proper motion is 0″.090 in 177°.2 (Greenwich).

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3639)...]

22 10 **12386.** **Σ 3015.** Fixed.

1866.65	189°.9	2″.81	3*n*	Δ
1894.70	191.1	3.12	2*n*	Gla
1902.63	190.2	2.92	2*n*	Hu

[Ma (*F. S.* **I**)... Ma (**XI**)... H (**VII**)... Se... Δ (**II**)... Glasenapp (**III**)... Cin⁵... Furner (*Mon. Not.* **LXVI**, 32)...]

22 10 **12387.** **♅ V. 48.** The place given in the *Synopsis* of the ♅ stars is that of θ Piscium, but ♅ says his pair is "a telescopic star just by θ southwards". The companion is DM (5°) 5174.

1903.94	3°.7	88″.45	2*n*	β⁶	8.0...9.3

22 12 **12388.** **β 1221.** Discovered with the 16-inch at the Warner Observatory in 1885. No motion.

1896.93	145°.9	1″.73	3*n*	A
1902.77	145.8	1.93	6*n*	Doo

[β (**XVII**)...β (3047)(*Pub L. O.* **II**)...A (3466)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

22^{m} 15^{s} **12389.** **H 1884.** The only measure is:

1905.72	247°1	12″40	1*n*	β^{6}	9.0...9.3

22 23 **12390.** **β 1222.** Discovered with the 12-inch. No motion. The later measures are:

1896.87	35°2	0″92	4*n*	A
1898.74	31.8	1.04	1*n*	Bowyer
1900.78	39.0	1.26	4*n*	Bryant
1901.41	37.1	1.15	6*n*	Doo

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3466)...Bowyer and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXII**, 383).... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

22 47 **12391.** **Σ 3016.** Unchanged.

1866.12	318°4	20″26	3*n*	*Δ*
1879.63	318.1	20.50	1*n*	Cin
1902.63	318.2	20.54	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Ra (**XXIV**)...*Δ* (**II**)...Cin^{5}...*Annals Toulouse Obsy.* **III**...]

22 54 **12392.** **Σ 3017.** *Cephei* 287. Probably fixed.

1870.84	32°6	2″03	5*n*	A
1890.76	31.5	2.09	1*n*	Big
1902.63	32.0	2.07	3*n*	Hu

The proper motion is given, 0″058 in 112°2 (Greenwich).

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...Se...Se^{2}...Bp...Da^{5}...Ra (**XXIV**)...H (**IV**)...Ba (**II**)...*Δ* (1125)...*Δ* (**I, II**)...WS...Gl...Ferr...Glasenapp (**II**)...Big (*Bul. Ast.* **XII**, 299)...Lau (4078)...]

22 57: **12393.** **H 311.** "Has a nebula in the field." The only measures give:

A and B

1904.63	291°9	21″41	2*n*	β	10.2...11.1

A and nebula

1904.61	229°3	145″9	1*n*	β

[H (**VII**)...β^{6}...]

23 4 **12394.** **H 3195.** The only observation since H is:

1904.53	100°8	14″81	2*n*	β^{6}	9.7...10.8

23 37 **12397.** **Hu 599.** (AC = **H 3196**). The duplicity of the principal star of H 3196 was discovered by Hussey in 1901. These are all the measures of the old companion.

AB and C

1880.70	18°8	20″14	1*n*	Cin	9.0...10.0
1900.77	19.6	20.74	1*n*	Hu	

[Cin^{6}...Wilson (Cin^{10})...Hu (*Bul. L. O.* No. 27)...]

12398. **H 987.** The only measure: 23^{m} 44^{s}

1905.59	281°5	13″41	1*n*	β^{6}

12399. **Ho 621.** No change. 23 45

1902.71	0°4	25″99	3*n*	Doo

[Ho (3558)...]

12400. **H 3197.** "A 10m star *p*." 23 51

1879.79	307°8	8″33	2*n*	Cin	8.5...9.5

[H (**VIII**)...Cin^{4}...Cin^{6}...]

12401. **H 1885.** "Three in a straight line." 23 51

AB	1905.59	247°6	21″10	1*n*	β^{6}	8.0...12.0
AC	1905.59	244.6	45.59	1*n*	β^{6}	...12.5

12402. **β 1149.** Discovered with the 36-inch. In the field with the multiple star, OΣ 496. The other measures are: 24 11

1898.81	308°9	0″56	2*n*	Hu
1901.79	305.1	0.60	2*n*	Doo

OΣ 496 (A) and *β* 1149 (AB)

1889.58	207°6	231″07	1*n*	β

[β (**XVI**)....β (2956)(*Pub. L. O.* **II**)....Hu (*Bul. L. O.* No. 44)....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12403. **Ho 200.** The later measures are: 24 19

1889.31	142°6	2″38	3*n*	β	6.6...10.6
1893.41	143.7	2.15	1*n*	Ho	

[Ho (2779, 3558)...β (2930)(*Pub. L. O.* **II**)...]

12404. **β 1266.** (AC = **Σ 3018**). The larger component of Σ 3018 was found to be a close pair with the 36-inch. The measures show rapid motion. It is a binary, and probably of short period. All the measures of the close pair are given. In some of them the position-angle is reversed. 24 29

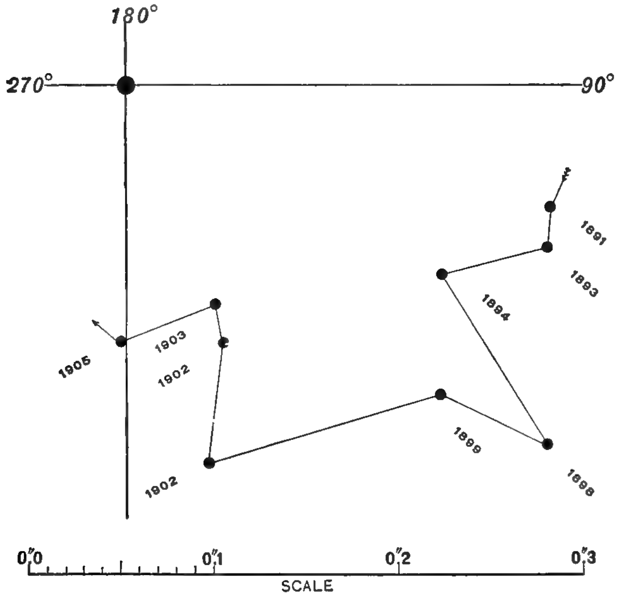
A and B

1891.69*	74°0	0″24	3*n*	β
1893.54*	65.9	0.23	1*n*	Lv
1893.64*	73.3	0.26	2*n*	W
1894.18*	59.1	0.20 ±	9*n*	Sp
1898.01*	49.7	0.30	5*n*	Lewis
1899.55*	45.5	0.24	3*n*	A
1902.24*	12.7	0.21	8*n*	Lewis
1902.78*	21.2	0.15	1*n*	Bryant
1903.80	32.3	0.30	3*n*	Biesbroeck
1903.95*	22.6	0.13	1*n*	Bowyer
1905.62*	359.0	0.14	2*n*	A

There is no change in the position of C since the first measures.

AB and C (= Σ 3018)

1830.52	204°0	18″92	2*n*	Σ
1864.45	204.0	18.98	3*n*	Δ
1870.07	203.8	18.83	4*n*	Du
1891.69	203.5	18.92	3*n*	β
1894.44	203.6	18.79	2*n*	Sp
1897.86	204.0	18.95	3*n*	Lewis
1899.54	203.4	18.77	1*n*	A
1902.63	203.2	18.99	2*n*	Hu



β 1266.

[β (**XVIII**)...β (3113)(*Pub. L. O.* **II**)...Lv (*A. J.* 382)...Sp (**III**)...Wilson ( ) ...Ma (*F. S.* **I**)...Ma (**XI**)...H (**IV**)...Δ (**II**)...Du...Cin⁵...A (3639)(*Bul. L. O.* No. 11).... Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 515; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Biesbroeck...]

(See p. 1086)

$24^{m}\ 29^{s}$ **12405.** **OΣ** 496. (AC = **H VI.** 25 = **Sh** 355 = **OΣ (App) 247**: CD = **Da** 2; AE = **H** 1888; FG = **H** 1887; CH = **H** 1886). Several double stars have their components in this group. The close pair, CD, was first seen by Dawes in 1841. All of the stars are relatively fixed.

A and B (= OΣ 496).

1851.76	336°8	1″51	1*n*	OΣ
1874.10	342.1	1.56	4*n*	Δ
1889.58	342.1	1.28	3*n*	β
1898.89	343.8	1.20	3*n*	Hu

C and D (= Da 2).

1841.82	222°3	1″46	2*n*	Da
1849.64	224.2	1.38	5*n*	OΣ
1870.71	223.0	1.41	7*n*	Δ
1889.58	224.1	1.51	3*n*	β
1898.76	221.5	1.45	3*n*	Hu

A and C (= H VI. 25 = Sh 355).

1849.64	269°2	75″77	5*n*	OΣ
1869.69	269.1	75.74	4*n*	Δ
1889.59	269.0	75.53	2*n*	β
1898.76	269.0	75.75	3*n*	Hu

A and E (= H 1888).

1870.74	113°9	43″34	3*n*	Δ
1898.89	114.8	42.96	3*n*	Hu

A and F

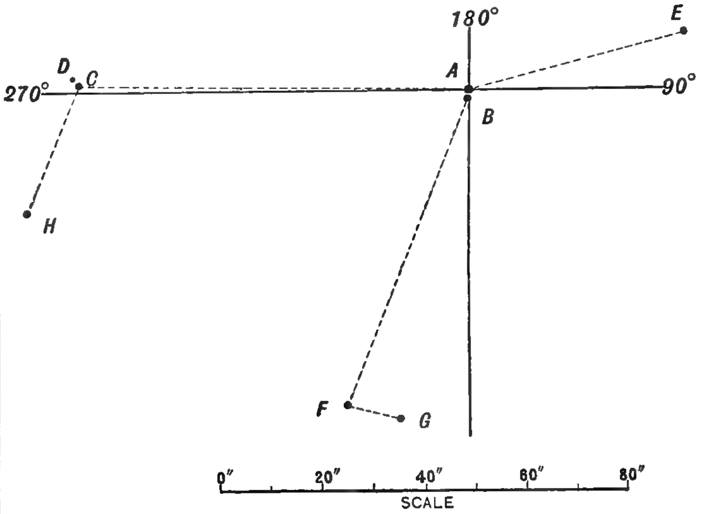
1870.74	338°4	67″27	3*n*	Δ
1898.89	338.5	67.29	3*n*	Hu

F and G (= H 1887).

1870.74	73°9	10″31	3*n*	Δ
1898.76	73.7	10.86	3*n*	Hu

C and H (= H 1886).

1830	340°5	18″ ±	1*n*	H



OΣ 496

[OΣ (**IX, X**)...Da³...Da (*Mon. Not.* **XXIV**, 117)...Δ (**I**)...WS...Hd...Bl (**V**)...Gl (*Ast. Reg.* **XVIII**, 285)...Franz (2650)...En (2742)...β³...β⁴...β (*Observatory*, **III**, 568)(*Pub. L. O.* **II**)...β (2957)...A (3466)...Hu (*Pub. L. O.* **V**)...]

12406. **Σ** 3019. (= **H N.** 137 = **S** 831). Fixed. $24^{m}\ 34^{s}$

1864.99	185°7	10″85	3*n*	Δ
1892.82	184.5	10.20	2*n*	Gla
1902.62	185.5	10.86	2*n*	Hu

[Σ¹...Ma (**XI**)...Ma (*F. S.* **I**)...Da²...Wr...Se...H (**VII**)...Ra (**XXIII**)...Du ...Δ (1196)...Δ (**I, II**)...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

12407. **β** 1150. Discovered with the 36-inch. 24 46

1898.68	49°7	0″57	1*n*	A

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3639)...]

12408. **OΣ** 497. Unchanged 24 50

1867.28	211°3	1″40	3*n*	Δ
1883.68	210.7	1.59	2*n*	Per
1898.60	212.4	1.24	3*n*	Hu

[Ma (**XI**)...Se...OΣ (**IX**)...Δ (**I**)...Lv¹...Per...Per (2560)...Glasenapp (**III**)...Hu (*Pub. L. O.* **V**)...]

25^m 4^s **12409. Σ 3020.** Perhaps the distance is a little greater.

1866.85	112°5	2″09	3*n*	Δ
1893.71	109.1	2.40	2*n*	Gla
1902.66	108.9	2.26	2*n*	Hu
1904.97	108.0	1.82	1*n*	Bowyer

[Ma (*F. S.* I)....Ma (**X**)....Se....Δ (**I**)....Glasenapp (**III**)....Bowyer (*Mon. Not.* **LXVI**, 32)...]

25 6 **12410. β 1151.** Discovered with the 36-inch. A difficult pair, and with some evidence of change. It is too faint to be included in the DM. In the field with Σ 3022.

1889.59	293°7	0″64	3*n*	β	9.7... 9.7
1899.59	291.4	0.67	1*n*	A	10.5...11.0
1901.79	286.5	0.72	2*n*	Doo	10.2...10.5

Σ 3022 (A) and β 1151 (AB)

1889.58	189°7	116″88	3*n*	β

[β (**XVI**)....β (2956)(*Pub. L. O.* **II**)....A (3639)....Doolittle (*Pub. Flower Obsy.* **II**)...]

25 9 **12411. Σ 3022.** (= **H** IV. 65.) No change in the Struve pair. The distant star is a very close and difficult double (= β 1151).

1866.38	226°3	20″43	3*n*	Δ
1889.58	226.3	20.36	3*n*	β
1902.65	226.2	20.36	2*n*	Hu

[H (**IV**)...Ma (*F. S.* **II**)...Bp...Ba (**II**)...Δ (**II**)...β (2957)(*Pub. L. O.* **II**)...]

25 19 **12412. β 774.** Discovered with the 6-inch at Mt. Hamilton in 1879. It is a difficult pair with a much larger aperture. Retrograde motion?

1880.58	6°7	0″51	3*n*	β
1890.64	4.1	0.52	3*n*	β
1892.16	1.8	0.45±	5*n*	Sp
1898.68	359.1	0.66	3*n*	A
1905.49	360.8	0.52	2*n*	A

[β (**XI**)...β^2...β^3...β (3048)(*Pub. L. O.* **II**)...Sp (**III**)...A (3585)...]

25 21 **12413. Σ 3021.** Relatively fixed. The principal star is given a proper motion of 0″069 in 144°2 (*A. G. Berlin*).

1867.29	308°5	8″34	5*n*	Δ
1892.83	307.5	7.98	2*n*	Gla
1902.62	307.9	8.66	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se^1...Wr...Δ (**II**)...Big...Glasenapp (**II**)...*Annals Toulouse Obsy.* **III**...]

25 38 **12415. OΣ 498** *rej.* Rejected in second edition of the *Poulkowa Catalogue*. The proper motion of A is given, 0″075 in 90° (*A. G. Harvard*).

1898.72	243°9	17″50	3*n*	Hu

[Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

26 4 **12418. H 1889.** The only measures are:

AB	1900.72	241°2	43″92	2*n*	β^5	7.7...12.0
AC	1900.72	57.4	55.81	2*n*	β^5	...11.7

26^m 13^s **12420. Σ 3024.** (= **H** II. 94 = **S** 832). Fixed.

1868.85	310°6	4″85	4*n*	Δ
1894.64	309.0	4.77	2*n*	Gla
1902.66	308.8	5.11	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**IX, XI**)...H^1...Da^1...Σ^1...Se...Wr...OΣ (**IX**)...H (**IV**)...Δ (1125)...Δ (**I, II**)...Big...Glasenapp (**III**)...]

26 16 **12421. Espin 109.** Discovered by Espin.

1905.93	48°6	5″96	1*n*	β	9.2...11.5

[Espin (3784)...β^6...] (See p. 1086)

26 21 **12423. Σ 3023.** Fixed.

1865.64	279°9	1″84	3*n*	Δ
1893.71	280.0	1.95	2*n*	Gla
1901.71	281.7	1.93	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X**)...Se...Se^2...Δ (**II**)...UL...Glasenapp (**III**)...Bowyer (*Mon. Not.* **LXVI**, 32)...]

26 35 **12425. Wn 6.** Discovered by Winnecke. This star has a considerable proper motion which belongs to both components.

Argelander	0″193 in 68°8
Stumpe	0.181 in 66.1
Kustner	0.148 in 61.4

The later measures show no sensible change.

1880.57	169°7	1″48	1*n*	β	8.0...10.5
1901.80	165.4	1.48	2*n*	β	8.5... 9.2

There is a 13.5m star, 133°2:23″4 (1901).

[Wn (1738)...β^3...β^5...]

27 37 **12428. A 641.** (AB = **OΣ** 499). The smaller component of OΣ 499 was found to be a close and difficult pair by Aitken in 1903. No other measures of this. There has been no change with respect to A.

A and BC

1869.85	79°0	9″37	5*n*	Δ
1898.67	78.3	9.55	3*n*	Hu
1903.44	77.4	9.78	1*n*	A

[OΣ (**IX**)...Δ (**II**)...Hu (*Pub. L. O.* **V**)...A (*Pub. A. S. P.* **XV**, 217)(*Bul. L. O.* No. 50)...]

27 46 **12431. Espin 110.** (AC = **H 1891**). The nearest companion discovered by Espin.

AB	1905.93	37°4	5″22	1*n*	β	9.5...10.5
AC	1905.93	333.6	16.65	1*n*	β	...10.0

[Espin (3784)...β^6...]

28 0 **12432.** 72 *Pegasi.* **β 720.** Discovered with the 18½-inch. A binary in direct motion. So far the change has been about 1°5 per year. The system has an annual proper motion of 0″035 in the direction of 101°4 (Auwers).

The following are the complete measures:

1878.74	127°7	0″40	3*n*	β
1878.74	128.7	0.37	1*n*	Δ
1880.01	311.0	0.41	3*n*	β
1882.62	308.9	0.48	1*n*	OΣ
1883.40	147.6	0.25	7*n*	En
1886.61	141.6	0.45	5*n*	HΣ
1887.60	141.8	0.3±	3*n*	Sp
1888.93	142.1	0.4±	8*n*	Sp
1889.50	146.0	0.38	3*n*	β
1890.55	148.3	0.37	3*n*	β
1891.67	149.5	0.33	3*n*	β
1893.54	151.3	0.30	1*n*	Lv
1893.67	150.9	0.42	3*n*	W
1893.97	160.7	0.35±	1*n*	Sp
1894.42	153.8	0.37	6*n*	Barnard
1896.67	157.0	0.39	3*n*	Lv
1897.83	158.4	0.41	3*n*	Hu
1897.85	158.5	0.38	9*n*	Gr. Obsy.
1898.48	160.6	0.47	4*n*	A
1899.81	167.8	0.35	1*n*	See
1900.59	164.0	0.43	3*n*	A
1900.84	177.0	0.55	1*n*	Do
1901.36	164.5	0.34	6*n*	Bowyer
1901.57	165.5	0.36	11*n*	Lewis
1901.84	170.3	0.43	3*n*	Doo
1902.11	161.3	0.32	8*n*	Bryant
1903.84	168.0	0.43	4*n*	Biesbroeck
1904.67	170.4	0.41	2*n*	A
1904.73	155.8	0.5±	3*n*	Lohse

[β (**X**)....β^{1}....β^{3}....β (2957, 3048, 3114)(*Pub. L. O.* **II**)....Δ (**I**)....OΣ (**X**)....En (2678)...Sp (**III**)... Lv (*A. J.* 382, 407)...Wilson (   )...Barnard (*A. J.* 447) ....Gore (*Mon. Not.* **XLVII**, 62)....HΣ (**XII**)....Hu (*A. J.* 427)....Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 516; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 806)...Do (3681)...Biesbroeck... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**) ...Lohse (*Pub. Potsdam Obsy.*)...A (3585)(*A. J.* 429)(*Bul. L. O.* No. 11)...]

(See p. 1086)

28m 1s **12433.** **A 791.** With another measure (*Bul. L. O.* No. 61) the mean is:

1904.45	352°3	1″02	3*n*	A	9.6...9.6

28 1 **12434.** **Σ 60, App I.** B is D. M. (59°) 2944. Change from proper motion.

1835.86	210°6	247″15	6*n*	Σ
1869.83	210.1	244.79	7*n*	Δ
1880.08	210.1	243.64	5*n*	Je
1891.59	209.8	243.01	3*n*	Mai
1904.75	209.6	241.97	2*n*	β

The five measures give one of these stars a proper motion of 0″091 in 78°4 (±180°).

[Ra (**XXV**)...Δ (**II**)...Maiebckato (*Obsns.* 1892)...Je (2345)...β^{6}...]

28 8 **12435.** **β 387.** Discovered with the 6-inch. Without change.

1877.77	69°5	5″94	2*n*	Cin	8.0...9.0
1891.87	70.8	5.82	2*n*	β	8.1...9.0
1898.65	70.0	5.91	3*n*	Bd	8.2...9.2

[β (**VI**)...β (2062, 3114)(*Pub. L. O.* **II**)...Δ (**I**)...Cin^{4}...Boothroyd (*A. J.* 478)...]

12436. **H 3204.** The only measure is: 28m 24s

1905.78	120°6	20″68	1*n*	β^{6}	8.5...12.5

12438. **Kr 65.** (= **H** 1892). Noted "duplex" in *A. G. Hels.* 28 28

1830	94°0	6″±	2*n*	H
1898.43	92.3	6.77	3*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12441. **β 388.** Discovered with the 6-inch. Heis gives this as a naked-eye star in *Andromeda*, 6–7 m. 28 52

1897.82	333°5	20″53	2*n*	β
1898.68	333.5	21.28	4*n*	Doo

[β (**VI**)...β (2062)(*Pub. L. O.* **II**)... Δ (**I**)... Doolittle (*Pub. Flower Obsy.* **I**)...]

12442. **H 3202.** "Fine. *Yellow: blue.*" 28 56

1877.78	247°2	4″22	2*n*	Cin	8.2...9.5
1892.77	239.3	4.05	2*n*	Gla	8.4...9.7

[Cin^{4}...Glasenapp (**II**)...]

12443. **β 81.** Discovered with the 6-inch. Probably fixed. 28 59

1877.86	14°8	1″96	2*n*	Cin
1886.40	13.4	1.96	3*n*	LM
1897.94	14.6	2.01	1*n*	Brown
1900.80	12.8	1.83	6*n*	Doo

[β (**I**)....β (*Mon. Not.* **XXXIII**, 351)....Δ (**I**)....Cin^{4}....LM....Brown (3646).... Doolittle (*Pub. Flower Obsy.* **I, II**)...]

12447. **See 492.** This star has some proper motion, 0″187 in 155°0 (Radcliffe). 29 20

1899.69	269°2	0″42	2*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

12449. **Σ 3025** *rej.* Measures by β^{6} 29 45

1902.69	56°6	21″77	2*n*	Hu

12450. **β 721.** Discovered with the 18½-inch. The change, if any, is in the distance. 30 7

1878.22	138°2	0″51	1*n*	β	9.0...9.0
1879.16	145.5	0.44	2*n*	Cin	8.0...9.0
1886.77	134.6	0.38	2*n*	LM	8.0...8.3
1898.68	117.1	0.73	1*n*	Bd	8.0...8.5
1899.68	131.7	0.32	3*n*	A	8.6...8.6
1899.81	127.0	0.30	1*n*	See	
1900.51	126.2	0.53	2*n*	Doo	8.6...8.6
1903.40	133.2	0.28	3*n*	A	

There is a faint star in the *n p* quadrant:

1898.68	301°7	21″38	1*n*	Bd	...12.5
1899.63	301.1	22.19	1*n*	A	...14.0

[β (**X**)...β^{1}...Cin^{5}... LM... Boothroyd (*A. J.* 478)...A (3639)... Doolittle (*Pub. Flower Obsy.* **I**)...]

30m 19s **12453.** **Σ 3026.** Unchanged.

1868.84	274°7	3″17	4*n*	Δ
1894.69	271.8	3.32	2*n*	Gla
1902.65	276.1	3.42	2*n*	Hu

[Ma (*F. S.* I)....Ma (XI)....H (IV)....Se....Δ (II)....Glasenapp (III)....Bowyer (*Mon. Not.* LXVI, 32)...]

30 24 **12454.** **Σ 3027** *rej.* The only measures are:

1902.69	11°0	20″94	2*n*	Hu	
1905.78	11.1	20.69	1*n*	β^6	8.5...10.7

30 27 **12455.** **Hu 791.** With another measure the mean is:

1904.49	126°7	2″81	2*n*	Hu	8.8...8.8

[Hu (*Bul. L. O.* No. 65)...]

30 45 **12456.** **β 775.** (= **β 1012**). Discovered with the 6-inch at Mt. Hamilton in 1879, and again independently with the 12-inch in 1881. It had been previously seen by Howe in 1877. In Cord. G. C. 6½ m. Without change.

1877.75	250°2	5″50	1*n*	Howe
1886.92	248.0	5.60	2*n*	Pollock
1898.70	251.2	5.28	3*n*	Cogshall
1898.74	250.6	5.28	3*n*	A

[β (XI, XIII)...β^2...β^3...Cin^4...Pollock (*Pub. Sydney Obsy.* 1891)(*Mem. R. A. S.* L)...Cogshall (*A. J.* 478)...A (3585)...]

30 46 **12457.** **H 3206.** The only measures are:

1877.78	348°3	3″17	2*n*	Cin^4	8.5...9.0
1886.90	348.3	3.44	4*n*	LM	8.2...8.4

30 53 **12459.** **Hn 58.** Later measures:

1888.19	355°9	3″37	3*n*	Com

[β^4...Com (VI)...] (See p. 1086)

31 9 **12461.** **Muller 2.** Discovered by F. Muller at the McCormick Observatory.

1899.78	302°5	3″19	3*n*	Hu

[O. Stone (*A. J.* 156)...LM...Hu (*Bul. L. O.* No. 44)...]

31 12 **12462.** **Ho 201.** No motion.

1894.80	341°5	3″55	2*n*	Ho
1902.25	340.0	3.85	9*n*	Doo

[Ho (2779, 3558)...]

31 27 **12465.** **H 316.** (= **H N. 35**). B. A. C. 8221. No measures by H. Relatively fixed.

1877.83	92°7	33″22	1*n*	β	
1901.72	92.6	33.22	3*n*	β	6.9...10.8

[H (V)...β^1...β^5...]

12468. **OΣ 500.** B.A.C. 8223. The measures are not accordant, but slow angular motion is shown, with no sensible change in the distance. 31m 40s

1845.24	299°4	0″45	2*n*	OΣ
1852.82	308.5	0.45	2*n*	OΣ
1873.52	319.5	0.45	7*n*	Δ
1879.80	316.5	0.52	3*n*	Hl
1883.16	326.7	0.40	6*n*	En
1888.91	322.6	0.50	3*n*	Hl
1889.80	319.3	0.53	2*n*	HΣ
1898.62	325.8	0.54	3*n*	Hu
1902.09	333.0	0.69	3*n*	Doo

The proper motion is 0″038 in 100°5 (Greenwich).

[Ma (XI, XIII)...OΣ (IX)...Δ (I)...Flm...WS...Sk^2...Do (*Trans. R. I. Acad.* XXIX, Part 13)....Do (2322, 3023, 3681)....Callandreau (*Bul. Ast.* XII, 523)....Hl (I, II)....En (2678)....Jones (*A. J.* 312)....Glasenapp (II, III)....Big (*Bul. Ast.* XII, 299)....Hu (*Pub. L. O.* V)....HΣ (XII)....Biesbroeck....Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* II)...]

12469. **See 493.** Later measures: 31 52

A and BC	1899.65	207°1	37″16	3*n*	Cg
B and C	1899.65	270.8	1.18	3*n*	Cg

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

12470. **H VI. 45.** The description in H's, "It is a star near ι [*Andromeda*] towards *o*". It is impossible to identify it with certainty. 32 :

12471. **Σ 3029.** Fixed. 32 5

1866.74	317°5	4″78	3*n*	Δ
1905.78	318.6	4.93	1*n*	β

[Ma (XI)...Ma (*F. S.* I)...Δ (II)...β^6...]

12472. **β 1336.** (ACD = **H 317**). In measuring the Herschel companions since Part I was in type, the principal star was found to be a close pair with the 40-inch. 32 10

A and B

1905.59	321°1	0″33	2*n*	β^6	8.5...8.9

AB and C

1905.59	229°0	19″50	2*n*	β	...11.2

AB and D

1905.59	257°7	50″65	2*n*	β	...11.4

12474. **Hu 792.** No other measures. 32 16

[Hu (*Bul. L. O.* No. 65)...]

12475. **β 855.** Discovered with the 15½-inch at the Washburn Observatory. 32 23

1888.51	199°1	0″79	3*n*	Com
1898.53	201.2	0.94	3*n*	Doo

[β (XII)...β^4...Com (VI)...Doolittle (*Pub. Flower Obsy.* I)...]

32^m 29^s **12476.** **Ho 202.** The other measures are:

1895.69	137°5	2″15	1*n*	Ho
1901.79	131.7	2.34	3*n*	Doo

[Ho (2779, 3558)...]

32 33 **12477.** **β 722.** Discovered with the 18½-inch. Without change. The other measures are:

1885.82	348°5	7″38	2*n*	HΣ
1897.82	348.9	7.26	2*n*	β
1900.78	347.6	7.45	2*n*	Doo

[β (**X**)...β^1...HΣ (**XII**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

32 37 **12479.** **Σ 3028.** The change is due to proper motion. The principal star has an annual movement of about 0″03 nearly in the direction of the small star. The following are all the measures:

1829.91	205°4	19″50	2*n*	Σ
1847.71	205.3	17.85	1*n*	Ma
1869.03	203.6	18.47	5*n*	Δ
1879.57	203.0	18.22	1*n*	Cin
1883.32	203.7	17.98	6*n*	En
1887.91	203.1	17.95	2*n*	Hl
1891.86	203.5	17.99	2*n*	HΣ
1892.90	203.5	17.60	2*n*	Gla
1902.66	203.0	17.71	2*n*	Hu
1905.65	202.8	17.37	3*n*	β

[Ma (*F. S.* **II**)...Δ (**II**)...Δ (2195)...Flm...En (2678)...Cin^5...Hl (**II**)...Glasenapp (**II**)...HΣ (**XII**)...β^6...]

32 46 **12481.** **H 5411.** The only measure since Herschel:

1892.77	40°1	16″13	2*n*	Gla	9.4...9.9

[Glasenapp (**II**)...]

32 56 **12483.** **Δ 26.** Discovered by Dembowski in 1871; near OΣ 500. Without change.

1878.78	70°5	1″96	1*n*	β	9.0...11.5
1903.67	70.9	2.16	3*n*	β	9.0...11.5

[Δ (**I**)...Δ (1979)...β^3...β^6...]

33 3 **12484.** **β 856.** Discovered with the 15½-inch at the Washburn Observatory.

1881.55	266°0	0″58	2*n*	β
1886.89	267.8	0.66	3*n*	Com
1898.53	265.3	0.62	3*n*	Doo
1904.58	270.5	0.49	2*n*	A

[β (**XII**)...β^4...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

33 11 **12485.** **H 1896.** The only measures are:

1902.77	115°6	16″33	3*n*	Es	6.8...11.2
1905.92	116.7	16.25	2*n*	β	...11.0

[Espin (*Mon. Not.* **LXIV**, 679)...β^6...]

12486. **Ho 203.** Without change. 33^m 11^s

1894.79	129°4	3″52	1*n*	Ho
1901.77	128.6	3.73	4*n*	Doo

[Ho (2779, 3558)...]

12487. Discovered by Comstock at the Washburn Observatory. 33 18

1905.59	135°7	3″76	1*n*	β

[Com (**VI**)...β^6...]

12490. Measured at Cin^5 for Weisse 41 (No. 12507). 33 37

1901.80	67°5	42″02	1*n*	β^5	9.0...9.5

12492. **OΣ 501.** (= **H 1900**). Without change. 34 6

1867.19	162°4	14″36	3*n*	Δ
1888.36	163.2	14.80	2*n*	HΣ
1898.66	163.7	14.83	4*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...HΣ (**XII**)...]

12493. **Ho 302.** The later measures are: 34 13

A and B

1905.59	29°3	79″98	1*n*	β
1905.75	29.5	80.76	2*n*	Doo

B and C

1905.59	71°2	8″56	1*n*	β
1905.74	76.1	8.39	4*n*	Doo

[Ho (2977)...β^6...]

12494. **OΣ 502.** Fixed. 34 15

1867.07	221°4	3″49	3*n*	Δ
1898.68	224.6	3.66	5*n*	Hu

The proper motion is 0″039 in 108°1 (Greenwich).

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

12496. **Hu 794.** With another measure (*Bul. L. O.* No. 65) the mean is: 34 22

1904.49	67°5	2″80	2*n*	Hu

12497. *κ Andromedae.* **H 1898.** Measures from β^3. H gave, 182°8 : 30″±. The change in the distance of C is due to the proper motion of A, 0″075 in 110°3 (Auwers). 34 30

AB	1901.72	191°7	46″75	2*n*	β
AC	1901.72	294.6	104.95	2*n*	β

[β^3...Cin^5...β^5...]

12498. **β 723.** Discovered with the 18½-inch. Fixed. 34 32

1888.93	168°2	....	1*n*	Lv
1891.77	167.8	3″66	3*n*	β
1902.04	167.7	3.59	8*n*	Doo

[β (**X**)...β^1...β (3114)(*Pub. L. O.* **II**)...Lv^1...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

34^m 32^s **12499.** **Hu** 793. Recently measured:

1904.58	7°.1	1″.10	2*n*	Hu	9.0...11.0

[Hu (*Bul. L. O.* No. 65)...]

34 33 **12500.** **Σ** 3030. (= **H** **N.** 91.) Probably fixed.

1829.61	220°.8	2″.49	4*n*	Σ
1842.78	222.0	2.65	1*n*	Ma
1856.82	223.3	2.62	3*n*	Se
1866.06	224.0	2.57	3*n*	Δ
1877.85	222.5	2.47	4*n*	Cin
1886.78	222.5	2.53	3*n*	LM
1892.66	227.9	2.46	2*n*	Gla
1902.66	222.4	2.61	2*n*	Hu

[Ma (**X**)... H (**V**)...Se... Δ (**II**)...Cin⁴...LM...Glasenapp (**II**)...'*Annals Toulouse Obsy.* **III**...]

34 45 **12501.** **Ho** 303. This pair has a proper motion of 0″.220 in 74°.2 (*A. G. Berlin*).

1898.59	189°.9	0″.92	3*n*	Hu

[Ho (2977)...Hu (*Bul. L. O.* No. 44)...]

34 46 **12502.** **β** 724. Discovered with the 18½-inch. Unchanged.

1889.88	88°.7	0″.5±	1*n*	Sp	
1891.77	87.4	0.64	3*n*	β	8.7... 9.1
1898.73	89.1	0.78	3*n*	Cg	9.0...10.0
1898.85	88.7	0.60	3*n*	A	8.8... 9.5
1901.79	86.9	0.71	3*n*	Doo	8.5... 9.2

[β (**X**)...β¹...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)...Cogshall (*A. J.* 478)...A (3585)...Doolittle (*Pub. Flower Obsy.* **II**)...]

34 49 **12503.** **H** 1899. *A. G. Harvard* gives this star a proper motion of 0″.054 in 90°. The only measure is:

1905.50	255°.0	16″.12	2*n*	β⁶	8.7...10.5

34 57 **12504.** **Hu** 795. With another measure the mean is:

1904.54	231°.4	2″.67	3*n*	Hu

[Hu (*Bul. L. O.* No. 65)...]

34 58 **12505.** **β** 857. Discovered with the 15½-inch at the Washburn Observatory. No change.

1887.77	296°.6	1″.66	3*n*	Com	8.4...9.3
1898.54	297.0	1.43	3*n*	Doo	8.6...9.5

[β (**XII**)...β⁴...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

35 3 **12506.** **Σ** 3031. (= **H** **N.** 136 = **S** 833). Without change.

1866.99	311°.8	14″.30	4*n*	Δ
1902.66	311.3	14.60	2*n*	Hu

[Ma (*F. S.* **II**)....Ma (**XI**)....H (**V**)....Da¹....Δ (**II**)....Glasenapp (**II**)....*Annals Toulouse Obsy.* **III**...]

12507. **Weisse** 41. "Duplex" in W¹. The measures in Cin⁵ belong to a star *n p* this. (See No. 12490). The Weisse star is not double, and has no near companion. 35^m 7^s

[β⁵...]

12509. **Σ** 3032 *rej.* Measures from H (IV). 35 16

1901.74	338°.9	19″.23	2*n*	β⁵	8.3...10.0
1902.69	338.3	19.48	2*n*	Hu	

12510. **β** 858. (AC = **β** 389.) The distant star was noted with the 6-inch, and the principal star subsequently found to a close pair with the 15½-inch. The latter is a binary in slow retrograde motion. The following are all the measures: 35 18

A and B (= β 858)

1881.57	276°.6	0″.48	3*n*	β
1881.72	273.9	0.53	1*n*	Ho
1885.83	267.7	0.67	2*n*	HΣ
1887.74	272.4	0.71	3*n*	Com
1891.64	268.9	0.65	2*n*	β
1893.55	263.7	0.54	5*n*	Sp
1897.82	269.6	0.71	1*n*	Dyson
1897.87	262.6	0.70	3*n*	A
1899.52	262.6	0.66	6*n*	Bowyer
1900.56	266.6	0.57	3*n*	Bryant
1901.04	261.7	0.62	11*n*	Lewis
1901.80	262.1	0.66	2*n*	Doo
1904.05	259.5	0.62	2*n*	Biesbroeck
1904.64	259.3	0.58	1*n*	A

AB and C (= β 389)

1881.62	51°.0	23″.66	3*n*	β
1881.76	50.5	23.78	1*n*	Ho
1885.83	53.3	23.64	2*n*	HΣ
1888.31	52.4	24.06	2*n*	Com
1891.64	52.1	23.24	2*n*	β
1902.86	52.9	22.83	2*n*	Lewis

[β (**VI, XII**)... β (2062, 3114)... β⁴... β (*Pub. L. O.* **II**)... Sp (**III**)... Com (**VI**)... A (*A. J.* 429) ... HΣ (**XII**)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 516; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 807)... Biesbroeck ... Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12511. 104 *Aquarii.* **H** 5413. The proper motion of 104 *Aquarii* is 0″.026 in 32°.9 (Auwers). The only measures are: 35 32

1892.82	5°.9	123″.21	2*n*	Gla (II)	4.8...7.1
1905.61	5.7	122.17	2*n*	β⁶	

12515. "Double" in Harvard Zones. The only measure is: 35 50

1901.60	146°.1	75″.64	2*n*	β⁵	9.7...13.0

12517. **OΣ** 503. Relatively fixed; but a common proper motion of 0″.103 in 237°.0 (*A. G. Berlin*). 35 59

1868.15	132°.2	1″.61	4*n*	Δ
1893.73	132.0	1.38	2*n*	Gla
1898.59	131.5	1.53	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)...Da³... Δ (**I**)...WS... Per (2560)... Per...Se...Glasenapp (**III**)...Maw (**III**)...Hu (*Pub. L. O.* **V**)...]

$36^m\ 27^s$ **12520.** **OΣ 504.** B. A. C. 8427. No change since OΣ.

1868.00	175°0	7″64	4*n*	*Δ*
1898.63	175.4	7.76	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...*Δ* (**I**)...Hu (*Pub. L. O.* **V**)...]

36 29 **12521.** **H 1903.** Both stars in DM.

1905.45	247°1	18″20	1*n*	β^6	9.3...9.4

36 30 **12523.** ω^2 *Aquarii.* **β 279.** Discovered with the 9.4-inch at the Dartmouth College Observatory. The bright star has a proper motion of 0″091 in the direction of 131°4 (Auwers). This is sufficiently large to show that the companion is moving with the primary. In twenty-three years there is no material relative change in the components.

1877.82	84°5	5″66	3*n*	Cin
1888.71	83.3	5.86	3*n*	*β*
1888.77	86.0	5.43	4*n*	T
1888.93	85.4	5.11	1*n*	Lv
1898.64	85.6	5.70	2*n*	*β*
1898.65	83.9	5.32	3*n*	Cogshall

[*β* (**V**)...*β* (*Mon. Not.* **XXXV**, 31)...*β* (2875)(*Pub. L. O.* **II**)...*Δ* (**I**)...*Δ* (2086)...Cin^4...T (2991)...Lv^1...Cogshall (*A. J.* 478)...Solá (3679)...]

36 36 **12524.** **β 725.** Discovered with the 18½-inch. Probably fixed. The other measures are:

1877.79	243°8	4″59	1*n*	Cin
1891.89	241.1	4.12	3*n*	*β*
1898.85	238.0	4.24	2*n*	*β*
1900.44	239.0	4.08	2*n*	Doo

[*β* (**X**)...β^1...*β* (3114)(*Pub. L. O.* **II**)...Cin^4...Doolittle (*Pub. Flower Obsy.* **I**)...]

36 42 **12525.** **β 993.** Discovered with the 18½-inch. Magnitude in Argelander 6.0; Harvard 6.9; A. G. 6.5. Groombridge 4130. The later measures are:

1892.73	277°4	2″79	1*n*	Wilson
1898.66	274.0	2.48	3*n*	Doo
1898.68	278.4	2.61	1*n*	Hu
1902.77	274.4	2.62	2*n*	Doo

The proper motion is small, 0″007 in 151°2 (Greenwich).

[*β* (**XIII**)...β^3...Wilson ( )...Doolittle (*Pub. Flower Obsy.* **I, II**)... Hu (*Bul. L. O.* No. 44)...]

37 31 **12529.** **β 994.** Discovered with the 18½-inch. No motion.

1893.77	315°1	1″45	3*n*	Wilson
1902.64	305.1	1.41	3*n*	*β*
1903.55	307.4	1.58	4*n*	Doo

[*β* (**XIII**)...β^3...Wilson ( )...β^6...Doolittle (*Pub. Flower Obsy.* **II**)...]

37 49 **12531.** **Σ 3033.** No material change.

1866.34	7°3	3″16	4*n*	*Δ*
1892.82	6.9	2.96	2*n*	Gla
1902.66	6.4	3.30	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)... H (**V**)... Se... *Δ* (**II**)...Glasenapp (**II**)... *Annals Toulouse Obsy.* **III**...]

12532. 78 *Pegasi.* A. G. C. 14. Discovered by Alvan G. Clark with a 12-inch in 1875. The proper motion is 0″077 in 116°0 (Auwers). There may be a little increase in the angle. $37^m\ 57^s$

1888.31	197°4	1″48	4*n*	HΣ
1889.48	197.0	1.44	3*n*	*β*
1901.14	199.0	1.38	2*n*	A
1901.50	198.0	1.39	5*n*	Lewis

[*Δ* (**I**)...OΣ (**X**)...β^1...β^2...*β* (*Am. Jour. Sci.* April 1879)...*β* (2957)(*Pub. L. O.* **II**)...Pt...T (2899)...Ho (2978)...Colllins (*Proc. Haverford Coll. Obsy.* 1891)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 516; **LXII**, 383; **LXIV**, 807)...A (*Bul. L. O.* No. 11)...HΣ (**XII**)...Maw (**IV**)...]

12533. **Hu 796.** The measures give: 37 58

1904.58	307°7	0″60	2*n*	Hu	9.5...9.8

[Hu (*Bul. L. O.* No. 65)...]

12534. **A. G. 294.** Noted as "duplex" in *A. G. Christiania.* 38 14

1898.47	121°8	17″46	3*n*	Doo

[*β* (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12535. **H 5417.** Probably fixed. 38 15

1856.94	322°8	9″30	1*n*	Se	7 ...9
1877.80	319.4	9.10	2*n*	Cin	6.2...9.0
1903.73	320.1	8.95	2*n*	Scott	6.0...9.5

[Se^1...Cin^3...Cin^4...See (3496)...Solá (3679)...Scott (*Mon. Not.* **LXIV**, 52)...]

12537. **Σ 3034.** Fixed. 38 36

1868.41	103°3	5″43	4*n*	*Δ*
1880.32	102.1	5.57	3*n*	*β*
1902.60	103.7	5.74	3*n*	*β*

Ma (*F. S.* **I**)...Ma (**XI**)...*Δ* (**II**)...β^3...Espin (*Mon. Not.* **LXII**, 530)...β^6...]

12538. **H 3211.** The distance is much larger. 38 50

1905.59	83°6	46″91	2*n*	β^6	8.9...9.0

12539. **Σ 3035** *rej.* The only measure is: 39 5

1905.59	310°0	28″11	2*n*	β^6	8.2...10.2

12540. **β 1223.** Discovered with the 12-inch. No motion. 39 10

1892.46	297°2	1″32	4*n*	Sp
1896.88	291.2	1.16	2*n*	A
1897.96	294.8	1.19	1*n*	Lewis
1901.90	297.1	1.27	7*n*	Doo

[*β* (**XVII**)...*β* (3047)(*Pub. L. O.* **II**)...A (3466)...Sp (**III**)...Lewis (*Mon. Not.* **LIX**, 400)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **I, II**)...]

12542. **OΣ 505.** Without change. 39 25

1867.94	61°7	1″98	4*n*	*Δ*
1880.59	62.2	2.01	1*n*	*β*
1898.63	59.7	2.25	3*n*	Hu

[Ma (**XIII**)...OΣ (**IX**)...Se...*Δ* (**I**)...Per...β^3...Hu (*Pub. L. O.* **V**)...]

39^{m} 47^{s} **12543.** 107 *Aquarii*. **Sh** 356. (= **♅ II.** 24 = σ 786). Probably unchanged. The proper motion is 0″087 in 54°2 (Auwers).

1855.93	140°8	5″64	2*n*	Se	
1866.40	139.9	5.63	3*n*	Δ	5.3...6.5
1877.72	138.3	5.86	2*n*	Cin	6.0...7.0
1887.90	137.7	5.92	4*n*	Hl	
1903.72	138.0	5.90	2*n*	Scott	

[H¹...H (**VIII**)...P¹...J²...Se¹...Se³...Flm...Ra (**XXI**)...Do (3023, 3378, 3799) (*Trans. R. I. Acad.* **XXIX**, Part 13)....Δ (I)....Pt....Cin³....Cin⁴....Wilson (Cin¹⁰) ... Lv¹ ... T (2991) ... Hl (**II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)....Glasenapp (**II**)....Scott (*Brit. Ast. Ass'n.* **V.** 75; **VI,** 250, 368)(*Mon. Not.* **LXIV,** 52)...See (3496)...Solá (3497, 3563, 3679)...]

39 52 **12544.** **Σ** 3036. No sensible change. The proper motion is given 0″06 in 180° (*A. G. Nico*).

1868.98	230°2	2″76	4*n*	Δ
1877.86	227.9	2.38	1*n*	β
1892.80	233.2	2.50	2*n*	Gla
1902.66	229.0	2.55	1*n*	Hu

[Ma (*F. S.* **II**)...Ma (**X**)...H (**V**)...Mh...Δ (**II**)...β¹...Cin⁴...LM...Glasenapp (**II**)...]

39 58 **12545.** **A** 312. No other measures.

[A (3784)(*Bul. L. O.* No. 16)...]

40 7 **12547.** **OΣ (App)** 248. Fixed. A more distant star measured by Franz.

1883.76	138°5	52″81	6*n*	Franz
1905.65	139.5	52.30	2*n*	β

There is a 12m star nearer A:

1901.83	339°4	23″23	1*n*	Espin
1905.62	339.3	23.35	1*n*	β

[Δ (**I**)...Franz (2650)...Espin (*Mon. Not.* **LXII**, 533)...β⁶...]

40 18 **12548.** **Σ** 3037. Without change.

A and B

1868.73	213°7	2″66	4*n*	Δ
1897.92	213.0	2.85	2*n*	Maw
1902.69	213.8	2.69	2*n*	Hu

A and C

1866.67	185°2	29″02	3*n*	Δ
1902.69	187.0	29.15	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XIII, XV**)... H (**IV**)...Hd... Δ (**II**)...WS²...Sk²...Big...En (2678)...Glasenapp (**II**)...Collins (*A. J.* 378)...Maw (**III**)...Bryant (*Mon. Not.* **LX**, 516)...]

40 24 **12549.** **β** 726. Discovered with the 18½-inch. No sensible change.

1886.85	324°5	0″68	2*n*	LM
1898.76	326.3	0.89	1*n*	Bd
1898.86	320.2	0.67	2*n*	A
1898.72	322.5	0.65	3*n*	Hu

[β (**X**)...β¹...Cin⁶...LM... Boothroyd (*A. J.* 478)... A (3585)...Hu (*Bul. L. O.* No. 44)...]

12550. **Σ** 3038. (= **H** 1907). "Both very *red*, almost ruby color," H. Only reddish with 6-inch (1876). No motion. 40^{m} 24^{s}

1867.01	274°8	4″33	3*n*	Δ
1881.50	276.5	4.73	3*n*	β
1902.69	274.2	4.42	2*n*	Hu
1902.88	275.5	4.42	1*n*	Do

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Flm...β⁴...Collins (*A. J.* 378)...Do (3931)...]

12551. **Egbert** 8. Discovered by Egbert at the Cincinnati Observatory. No change. 40 26

1879.74	86°1	1″38	1*n*	Cin	
1901.65	86.8	1.27	2*n*	β	8.7...8.8

[Cin⁵...Cin⁶...β⁵...]

12552. **Σ** 3039. (= **♅ IV.** 107 = **S** 834). Change from proper motion. From the meridian positions Kustner finds the proper motion almost wholly in R. A., 0″026 in 272°1. This seems to be erroneous as the measures of B give the motion practically all in Declination. The following positions, commencing with Struve, make the proper motion of A, 0″038 in 174°0. 40 49

1783.62	39°6	26″20	1*n*	♅
1830.93	36.4	30.33	3*n*	Σ
1850.88	35.5	31.00	3*n*	Ma
1865.33	34.6	31.46	5*n*	Δ
1902.95	33.3	32.50	3*n*	Do
1905.63	32.9	32.46	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XIII, XV**)...H (**IV**)... Δ (1573)...Δ (**II**)...Flm...WS² ...Sk²...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...Do (3931)...β⁶...]

12555. **Barnard** 19. Discovered by Barnard with the 12-inch of the Lick Observatory. 40 53

1897.96	161°8	0″37	1*n*	Lewis
1901.79	169.4	0.59	3*n*	Bryant

[β (2957)(*Pub. L. O.* **II**)...Lewis and Bryant (*Mon. Not.* **LIX**, 400; **LX**, 516; **LXII**, 383; **LXIV**, 807)...]

12558. **A. G.** 295. Noted as "duplex" in *A. G. Christiania*. 41 24

1898.47	104°5	14″22	3*n*	Doo

[β (*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12559. **β** 727. Discovered with the 18½-inch. Probably unchanged. 41 26

1885.82	313°6	16″86	2*n*	HΣ
1891.64	315.2	16.83	3*n*	β
1899.74	316.4	16.90	5*n*	Doo

[β (**X**)....β¹.....β (3114)(*Pub. L. O.* **II**)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy* **I**)...]

12560. Δ 27. Triple discovered by Dembowski in 1876. The only other measures show no change. 41 32

AB	1901.23	358°5	1″64	2*n*	β	8.6...10.8
AC	1901.23	144.7	10.48	2*n*	β	...10.1

[Δ (**I**, p. 347)...β⁵...]

41^m 33^s **12561.** **β 390.** Discovered with the 6-inch. Change in distance?

1879.59	233°9	18″35	1*n*	Cin
1880.74	233.9	18.02	1*n*	β
1892.84	233.3	17.28	2*n*	Wilson
1899.68	232.2	17.58	2*n*	Doo
1905.84	232.0	16.92	2*n*	β

Another and similar pair, not given in Part I, was measured for β 390. This is DM (48°) 4135, 4^m 28^s *p* and 11′ *s* of β 390.

1905.93	235°5	12″65	1*n*	β	8.5...11.5

[β (**VI**)...β (2062)...β^3...Cin^5...Wilson (   )...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

41 35 **12562.** **β 995.** Discovered with the 18½-inch. This is a naked-eye star in *Andromeda.* Change in angle is probable. These are all the measures:

1879.61	240°0	0″73	1*n*	Cin
1880.01	245.4	0.88	2*n*	β
1889.48	243.4	0.93	3*n*	β
1891.75	239.8	0.77	3*n*	β
1894.60	238.4	0.73	7*n*	Sp
1898.65	237.5	0.81	4*n*	A
1904.19	238.4	0.86	2*n*	A

The proper motion is 0″031 in 144°8 (Greenwich).

[β (**XIII**)...β^3...β (2957, 3114)(*Pub. L. O.* **II**)...Cin^5...Sp (**III**)...A (3585)...]

41 45 **12563.** **Σ 3041.** (AB = **OΣ (App) 249**). No change in BC, but the distance of AB is slowly diminishing from proper motion. This is given from meridian observations:

A = 0″031 in 33°6 *A. G. Berlin*
0.040 in 20.7 *Rechenberg*
BC = 0.106 in 124.4 *A. G. Berlin*
0.096 in 118.5 *Rechenberg*

A and BC

1832.19	347°6	71″09	5*n*	Σ
1866.18	349.5	69.01	3*n*	Δ
1887.88	350.5	67.28	2*n*	Hl

These measures give 0″098 in 123°8 for the apparent movement of BC. This is practically identical with the motion found from meridian positions, and suggests that perhaps the whole change may be explained by this motion, and not in part by any movement of A:

A and B

1891.97	350°3	65″37	1*n*	Big
1902.67	350.8	64.52	2*n*	Hu

C and B

1866.34	180°5	3″24	4*n*	Δ
1887.88	181.5	3.16	2*n*	Hl
1890.77	179.2	3.16	4*n*	Giacomelli
1891.97	181.3	3.20	1*n*	Big
1898.89	177.1	3.43	4*n*	Coleman
1902.67	179.8	3.36	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI**)...Δ (**II**)...Δ (2195)... Do (3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Flm...Giacomelli (**III**) ... Hl (**II**)...Cin^5 ... Glasenapp (**II**)...Big...Big (*Bul. Ast.* **XII**, 299)...Franz (3464)...*Annals Toulouse Obsy.* **III**...Lewis (*Observatory* **XXV**, 403)...Scott (*Mon. Not.* **LXIV**, 52)... Rechenberg (3482)....Coleman (*Mem. R. A. S.* **LIV**)....Lau (*Bul. Ast.* **XXII**, 238)...Bowyer (*Mon. Not.* **LXVI**, 32)...]

12564. 20 *Piscium.* **S 835.** Nothing but the following since 1824: 41^m 46^s

1900.61	285°1	172″73	2*n*	β^5	6...8.6

12567. **Σ 3040.** Unchanged. 42 0

1867.00	219°3	4″39	3*n*	Δ
1893.74	218.1	4.42	2*n*	Gla
1902.66	219.8	4.45	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Se...Δ (**II**)...Cin^6...Glasenapp (**III**)...*Annals Toulouse Obsy.* **III**...]

12569. **β 1152.** Discovered with the 36-inch. Probably unchanged. The later measures are: 42 18

B and C

1898.78	102°8	0″60	2*n*	A
1901.83	100.3	0.74	3*n*	Doo

A and BC

1898.68	136°1	74″42	3*n*	A
1901.83	135.8	74.67	2*n*	Doo

The proper motion is given, 0″046 in 92°5 (Greenwich).

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3585)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12570. **OΣ 506** *rej.* Rejected in second edition of the *Poulkowa Catalogue.* No change. 42 34

1877.80	79°4	18″09	1*n*	β
1898.77	79.4	18.37	3*n*	Hu
1901.82	79.7	18.38	2*n*	Doo

[Ma (**XI**)...Δ (**I**)...β^1...Hu (*Pub. L. O.* **V**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12571. δ *Sculptoris* **β 1013.** (AC = **H 3216**). The close star was discovered with the 12-inch on Mt. Hamilton in 1881. Auwers gives the proper motion of δ *Sculptoris* 0″108 in the direction of 154°0. All the measures of the Herschel star are given. The three sets of measures seem to indicate common proper motion, as otherwise the distance should have increased about 1″3 from 1881 to 1898. 42 40

A and B

1881.86	228°2	3″36	2*n*	β
1891.64	228.9	3.34	2*n*	β
1899.68	229.9	3.32	2*n*	A

A and C (= H 3216)

1830	300°6	80″ ±	1*n*	H	...10
1881.88	296.6	74.31	3*n*	β	... 8.9
1891.64	296.7	74.03	2*n*	β	... 8.8
1898.74	296.7	74.23	2*n*	Bd	... 8.0

[β (**XIII**)...β^3... β (3114)(*Pub. L. O.* **II**)... Boothroyd (*A. J.* 478)... A (3639)...]

12573. **OΣ 507.** (AC = **OΣ (App) 250**). B. A. C. 8277. No change in the distant star, but AB is undoubtedly a binary system. 42 51

A and B

1843.31	217°5	0″4±	2*n*	Ma
1847.01	224.4	0.56	2*n*	OΣ
1869.43	240.6	Cun.	4*n*	Δ
1880.72	253.8	0.58	2*n*	β
1889.42	256.1	0.66	3*n*	HΣ
1897.07	259.2	0.67	2*n*	A
1898.70	263.4	0.66	3*n*	Hu
1903.92	267.7	0.61	2*n*	Biesbroeck

AB and C

1867.96	353°6	48″86	3*n*	Δ
1880.72	353.4	48.87	2*n*	β
1898.70	352.8	49.33	3*n*	Hu

The proper motion of the principal star is given, 0″027 in 119°0 (Greenwich), and C appears to have the same movement.

[Ma (**XI**)...OΣ (**IX, X**)...Δ (**I**)... Flm... Franz (2650)...β^{3}...Renz (*Bul. St. P. Acad* 1892)....A (3466)....Do (3681)....Hu (*Pub. L. O.* **V**)....HΣ (**XII**).... Biesbroeck...]

43^{m} 0^{s} **12575.** 6 *Cassiopeiae*. **OΣ** 508. Relatively fixed, but a common proper motion of 0″019 in 238°7 (Auwers).

1868.50	195°6	1″60	5*n*	Δ
1887.65	200.8	1.54	2*n*	T
1898.61	195.8	1.62	3*n*	Hu
1901.84	198.7	1.73	3*n*	Doo

[Ma (**XI**)... Da^{3}...Δ (**I**)... OΣ (**IX**)...WS...T (2899)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **II**)...]

43 1 **12576.** **Hu** 797. With another measure (*Bul. L. O.* No. 65) the mean is:

1904.53	132°4	0″78	2*n*	Hu

43 15 **12577.** **Weisse** 42. "Duplex" in W^{2} No near companion seen (1874), and the 40-inch (1900) shows nothing.

[β^{5}...]

43 37 **12581.** **H** 5423. "Very delicate". Error of 5′ declination in Lalande. The only measures are:

1877.87	305°9	12″89	1*n*	Cin	6.5...10.5
1897.69	305.5	13.58	4*n*	See	6.0...12.4

[Cin^{4}...See (3496)...]

43 40 **12582.** **Weisse** 43. "Duplex" in Weisse. Examined twice with the 40-inch in 1901, and not a double star of any class.

[β^{5}...]

44 30 **12587.** **OΣ** 509. No material change.

1865.79	104°7	5″24	3*n*	Δ
1877.79	106.6	5.55	1*n*	β
1889.80	104.7	5.37	2*n*	HΣ
1898.74	104.4	5.52	3*n*	Hu

[Ma (**XI, XIII**)...OΣ (**IX**)...Da^{3}...Ba (**I**)...Δ (**I**)...β^{1}...Hu (*Pub. L. O.* **V**)... HΣ (**XII**)...]

12588. **A** 792. With other measures (*Bul. L. O.* No. 61): 44^{m} 32^{s}

1904.50	248°2	0″33	3*n*	A

12589. **A** 793. With later measures (*Bul. L. O.* No. 61): 44 37

1904.58	296°0	0″16	3*n*	A	8.5...8.7

12590. **A** 794. With other measures of the close pair (*Bul. L. O.* No. 61): 44 52

1904.51	17°9	0″75	3*n*	A

12591. **H** 3219. Probably fixed. 45 0

1878.78	346°1	10″36	2*n*	Cin	8.2...10.2

[Cin^{4}...Cin^{5}...] (See p. 1086)

12593. **H** 3220. "Fine". Change in distance, or what is more probable, an error in one of the observations. 45 15

1879.57	19°3	30″85	1*n*	Cin^{5}	9.5...9.8
1905.62	19.1	32.58	1*n*	β^{6}	9.5...9.6

12594. **A** 795. With later measures (*Bul. L. O.* No. 61): 45 15

1904.51	312°4	1″08	4*n*	A

12595. **A** 796. With later measures (*Bul. L. O.* No. 61): 45 27

1904.51	32°2	0″49	4*n*	A

12596. **OΣ** 510. (= **β** 1038 *rej.*; AC = **H** 1911). No change in C, and motion in the close pair is not certain. The components are very nearly equal, and the angle is reversed by some observers. 45 31

A and B

1848.43	347°8	0″40	3*n*	OΣ
1873.12	335.2	0.48	3*n*	Δ
1883.33	354.2	0.20	5*n*	En
1888.73	337.6	0.60	3*n*	β
1896.91	335.2	0.53	3*n*	A
1898.68	335.0	0.40	3*n*	Hu

AB and C

1868.27	345°2	21″00	5*n*	Δ
1896.68	345.5	21.35	3*n*	Hu

The principal star is given a proper motion of 0″018 in 141°2 (Greenwich).

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Flm...En (2678)...β (2875)(*Pub. L. O.* **II**)... Big (*Bul. Ast.* **XII**, 299)...A (3466)...HΣ (**XII**)...Hu (*Pub. L. O.* **V**)...]

(See p. 1086)

12599. **See** 497. The other measures are: 45 41

1899.37	69°3	4″78	3*n*	Cg	8.2...12.3

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

12600. **H** 319. The only measures are: 45 42

1901.60	284°7	15″39	2*n*	β^{5}	9.5...11.7

45^{m} 51^{s} **12601.** **Σ** 3042. (= **Sh** 357.) *Andromedae* 28. The distance may be increasing.

1867.51	89°0	4″51	4*n*	Δ
1891.35	88.2	5.09	5*n*	Gla
1902.64	88.1	5.07	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...Bp...Da^{1}...Se...Wr...Ra (**XXIII**)...Bl (**V**) ...Ferr....Δ (**I, II**)....Δ (1196)....Glasenapp (**II, III**)....*Annals Toulouse Obsy.* **III**...]

46 1 **12604.** **H** 1913. The late measures disagree with H in angles:

AB	1905.74	295°5	23″95	2*n*	β^{6}	9.8... 9.8
BC	1905.74	346.7	22.50	2*n*	β^{6}	...12.5

46 7 **12605.** **β** 728. Discovered with the 18½-inch. No evidence of motion.

1883.34	351°9	1″20	7*n*	En
1892.73	353.7	1.37	1*n*	Wilson
1898.54	354.0	1.26	4*n*	Doo

[β (**X**)...β^{1}... En (2678)...Wilson (   )... Doolittle (*Pub. Flower Obsy.* **I**)...]

46 9 **12606.** **Ho** 204. The measure by Hough in 1893 belongs to some other pair, possibly to H 995 (No. 12657). If that pair, it would confirm the apparent change shown by the recent measures.

1893.78	8°7	7″07	1*n*	Ho
1896.78	356.2	5.87	3*n*	Lv
1904.47	356.6	5.65	2*n*	β
1905.74	356.9	5.80	3*n*	Doo

[Ho (2779, 3234)...Lv (*A. J.* 407)...β^{6}...]

46 13 **12607.** **See** 498. Discovered by Cogshall.

1896.84	176°6	4″36	2*n*	Cogshall
1899.37	175.1	4.24	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 486)...]

46 34 **12608.** **β** 996. Discovered with the 18½-inch. The large star has a considerable proper motion.

Porter	0″288 in	81°8
Greenwich	0.336 in	82.4

This may be a binary in slow direct angular motion, with a large movement in space common to both components. The following are all the measures:

1880.64	64°7	5″52	4*n*	β
1888.74	67.1	5.43	3*n*	β
1889.51	68.0	5.77	3*n*	β
1898.62	70.9	5.72	2*n*	β
1904.75	71.9	5.63	2*n*	β

Engelhardt (*Obsns. Astron.* III) measures a distant star, DM (74°) 1049, 130°6 : 165″74 (1894.11) 2*n*.

[β(**XIII**)...β^{3}...β (2875, 2957)(*Pub. L. O.* **II**)...β^{6}...]

12609. **β** 859. Discovered with the 15½-inch at the Washburn Observatory. The later measures are: 46^{m} 35^{s}

1887.81	214°8	0″64	3*n*	Com
1899.29	214.2	0.69	4*n*	Doo

[β (**XII**)...β^{4}...Com (**VI**)...Doolittle (*Pub. Flower Obsy.* **I**)...]

12610. **Σ** 3043. Fixed. 46 45

1867.62	250°6	15″49	4*n*	Δ
1892.89	249.9	15.78	2*n*	Gla
1902.64	250.1	15.68	2*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...Δ (**II**)...Cin^{5}...Glasenapp (**II**)...]

(See p. 1086)

12611. **β** 1153. A very difficult pair of small stars, discovered with the 36-inch. Too faint to be given in the DM. In the field with OΣ 511. 46 45

A and B

1899.58	318°6	0″43	2*n*	A

AB and C

1899.58	339°6	13″84	2*n*	A

AB and OΣ 511 (A)

1889.69	66°0	176″51	2*n*	β	...6.8

[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...A (3639)...]

12612. **H** 1914. Nothing later but the following: 46 47

1902.65	266°3	4″09	2*n*	β^{6}	11.2...11.3

12613. **Σ** 3044. (= **H** 320.) No material change. 46 51

1864.95	282°0	18″74	3*n*	Δ
1896.44	281.6	18.90	3*n*	Coleman
1902.65	278.8	19.16	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...H^{1}...H^{2}...Bp...P^{1}...Se^{1}...Se^{3}...Ra (**XXI**)... Ba (**II**)...Du...Δ (1196)...Δ (**I, II**)...T (3186)...Glasenapp (**II**)...Coleman (*Mem. R. A. S.* **LIII**)...*Annals Toulouse Obsy.* **III**...]

12615. **OΣ** 511. No change. The measure in Ma (XI) belongs to OΣ 513, and the one in Doolittle (*Pub. Flower Obsy.* II) to OΣ 514. 47 8

1867.28	35°2	10″40	3*n*	Δ
1898.98	35.4	10.47	3*n*	Hu

The proper motion is small, and apparently uncertain:

Battermann	0″024 in	209°6
Greenwich	0.012 in	94.8

[OΣ (**IX**)...Δ (**I**)...Hu (*Pub. L. O.* **V**)...]

12617. **H** 1916. The only measure: 47 28

1905.62	36°1	16″59	1*n*	β^{6}	9.5...9.5

12618. **OΣ (App)** 251. B is DM (50°) 4179. 47 31

1883.87	198°4	42″99	5*n*	Franz
1905.68	200.2	43.52	3*n*	β

The three sets of measures give 0″.082 in 96°.4 for the proper motion of A. From meridian positions this is given, 0″.066 in 79°.6 (Greenwich).

There is a 13 m star near B:

1905.72	171°.2	14″.64	1*n*	β

[Δ (I)...Franz (2650)...β^6...]

$47^m\ 32^s$ **12620.** **H 3223.** The only measure is:

1905.60	355°.5	45″.91	1*n*	β^6	8.6...9.0

47 58 **12621.** **Ho 205.** No motion.

1904.97	180°.1	4″.37	3*n*	β

The proper motion is 0″.060 in 83°.3 (Greenwich).

[Ho (2779)...β^6...]

48 9 **12623.** B. A. C. 8308. From H^3. Probably fixed.

1903.73	269°.1	6″.96	2*n*	Scott
1903.80	268.0	6.60	5*n*	Jouffray

[H^3... Dun...WJ... Cin^4... Glasenapp (**II**)... Scott (*Brit. Ast. Ass'n.* **VI**, 368) (*Mon. Not.* **LXIV**, 52)...Do (3799)...Jouffray (*Bul. Ast.* **XXI**, 299)...]

48 13 **12624.** **Sh 358.** (= σ 790). The following are all the measures since 1822:

1881.53	327°.8	37″.60	3*n*	β	8.0... 9.7
1896.81	329.2	37.47	2*n*	Lv	7.8... 8.9
1904.58	329.2	37.01	2*n*	β	8.0...10.3
1904.70	329.0	36.98	2*n*	Es	8.0... 9.5

[β^4...β (*Mon. Not.* **XXIV**, 381)...Lv (*A. J.* 407)...Espin (*Mon. Not.* **LXVI**, 144) ...β^6...]

48 17 **12625.** **Σ 3045.** No material change.

1867.72	260°.7	1″.73	4*n*	Δ
1894.69	268.1	2.10	2*n*	Gla
1905.61	266.2	1.62	2*n*	β

[Ma (*F. S.* **I**)...Ma (**X, XIII**)... H (**V**)...Se... Δ (**II**)...Cin^6...UL...Glasenapp (**III**)...β^6...]

48 50 **12628.** **OΣ** (**App**) **252.** Unchanged.

1905.64	143°.4	111″.56	2*n*	β

[Δ (I)...Franz (3464)...β^6...]

49 0 **12629.** **H 3226.** Nothing but this since H:

1905.59	7°.0	45″.12	2*n*	β^6	7.0...12.5

The large star is given a proper motion of 0″.032 in 257°.5 (Greenwich).

49 12 **12630.** **A 798.** With other measures the mean result is:

1904.56	25°.7	0″.41	3*n*	A	8.5...9.8

[A (*Bul. L. O.* No. 61)...]

12631. **β 729.** Discovered with the 18½-inch. Without change. The magnitude in O. Arg. is 7.0. $49^m\ 14^s$

1891.89	344°.9	11″.22	2*n*	β
1898.85	344.9	11.47	2*n*	β
1901.89	345.7	11.59	2*n*	Doo

[β (X)...β^1...β (3114)(*Pub. L. O.* **II**)...Doolittle (*Pub. Flower Obsy.* **II**)...]

12632. **A 797.** With another measure (*Bul. L. O.* No. 61): 49 19

1904.52	36°.9	4″.40	2*n*	A

12635. **A. G. 296.** Double in *A. G. Lund.* Measures by β^6 49 37

1904.71	53°.4	5″.03	2*n*	Es	9.1...9.2

[β^6...Espin (*Mon. Not.* **LXVI**, 144)...]

12639. **Σ 3046.** This appears to be a system of the 61 *Cygni* type. The relative change so far is practically rectilinear. The proper motion is given: 50 15

Stumpe	0″.352 in 248°.5
Paris	0.288 in 270.0

The measures are discordant for a pair of this class.

1830.15	232°.2	2″.52	4*n*	Σ
1843.80	234.8	2.46	1*n*	Ma
1851.88	239.4	2.81	1*n*	Σ
1857.42	241.2	2.79	2*n*	Se
1864.78	242.1	2.88	4*n*	Δ
1875.28	244.8	2.82	2*n*	Δ
1886.73	246.5	3.17	3*n*	LM
1892.89	246.0	2.92	2*n*	Gla
1895.83	249.2	3.32	2*n*	Collins
1896.61	247.0	3.30	2*n*	Soulé
1902.66	250.7	3.14	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**XI**)...OΣ (**IX**)...Se...Δ (1475)...Δ (**II**)...Flm...WS...Gl ...Sk^2...Ferr...Pt... Do (2307, 3023, 3378, 3799)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Cin^4...Cin^5...Cin^6...Lv^1...LM...β^1...Wilson (Cin^{10})...Glasenapp (II)...Collins (*A. J.* 378)...Soulé (*A. J.* 410)...*Annals Toulouse Obsy.* **III**...Sk^5...]

12642. **H 1919.** Nothing later but this: 50 37

1905.59	54°.7	10″.05	2*n*	β^6	9.3...11.5

12643. **Weisse 44.** "Duplex" in W^1. The only measure is the following: 50 40

1900.78	253°.7	11″.81	2*n*	β^5	9.0...9.1

12644. **H 2920.** The only measure is: 50 51

1905.59	256°.9	20″.21	1*n*	β^6	9.0...10.8

12645. **β 1224.** Discovered with the 36-inch. In DM 7.5 m. Piazzi XXIII. 236. 50 53

1899.63	201°.4	4″.10	3*n*	A

The proper motion of A is 0″.030 in 101°.6 (Greenwich).

[β (**XVII**)...β (3047)(*Pub. L. O.* **II**)...A (3639)...]

50^{m} 58^{s} **12647.** **H 1921.** Nothing later but the following:

1905.58	228°.2	2″.79	1*n*	β^6	11.5...11.5

51 7 **12648.** **A. G. 297.** Double in *A. G. Lund.* Measures by β^6.

1904.74	316°.6	1″.98	4*n*	Es	9.2...9.3

[β^6...Espin (*Mon. Not.* **LXVI**, 144)...]

51 12 **12649.** **H 5435.** "Duplex" O. Arg. S. No motion. There is a 12 m from B, 81°.6 : 21″.9 (1905).

1877.81	7°.3	14″.72	2*n*	Cin	8.5...9.5
1905.76	6.8	14.81	1*n*	β	8.5...9.0

[H^3...Cin^4...β^6...]

51 18 **12651.** **OΣ 512.** Apparently fixed. The proper motion is 0″.029 in 248°.1 (Battermann).

1869.22	290°.9	4″.29	4*n*	Δ
1898.71	294.2	3.98	4*n*	Hu

[OΣ (**IX**)...Δ (I)...Hu (*Pub. L. O.* **V**)...]

51 28 **12652.** **A 799.** With other measures (*Bul. L. O.* No. 61):

1904.52	12°.8	1″.65	3*n*	A	8.6...8.7

51 38 **12654.** **H 321.** "Similar but fainter pair *n f*".

1901.71	132°.6	20″.47	2*n*	β^5	7.5...11.2

51 50 **12655.** **Σ 3047.** (AC = **β 280**). The small star was discovered with the 9.4-inch of the Dartmouth College Observatory. The close pair is probably a binary, but the motion is very slow. The relation of the third star to the system is still uncertain.

A and B

1832.20	65°.6	1″.18	3*n*	Σ
1869.68	67.5	1.02	2*n*	Δ
1880.74	70.3	0.89	1*n*	β
1891.80	73.1	0.92	2*n*	β
1898.61	71.0	1.14	2*n*	Doo
1902.69	71.8	1.05	1*n*	Hu

A and C

1886.90	193°.2	8″.27	2*n*	Hl
1891.80	189.8	7.90	2*n*	β
1898.61	186.2	8.20	2*n*	Doo

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^3...β (3114)(*Pub. L. O.* **II**)...Hl (II)...Doolittle (*Pub. Flower Obsy.* **I**)...]

General references:

[Ma (*F. S.* **II**)(XI, XIII, XV)... H (IV)...Se...OΣ (**IX**)...Gl...WS... Δ (II)... Glasenapp (III)...Bryant (*Mon. Not.* **LX**, 516)...]

51 57 **12656.** **Σ 3048.** (= **S 836**). These stars are relatively fixed, but have a common proper motion:

Stumpe 0″.198 in 203°.8
Porter 0.182 in 201.2

1865.79	313°.9	9″.10	3*n*	Δ
1892.92	312.0	8.52	2*n*	Gla
1901.80	312.4	9.28	3*n*	Hu
1905.66	313.5	9.07	2*n*	β

Glasenapp measures a 9.9 m star, 240°.0 : 48″.90 (1892.92) 2 n.

[H^1...Ma (*F. S.* **I**)...Bp...Da^1...Da^3...Se^1...Ra (**XXI**)...Δ (II)...Glasenapp (II)...*Annals Toulouse Obsy* **III**...β^6...]

12657. **H 995.** "A large and a very small star". Estimated, 360° : 6″ : 9...12 (1876). Perhaps some change in the angle (see No. 12606). Lalande 46970. 51^{m} 58^{s}

1904.52	15°.2	6″.41	2*n*	β^6	8.5...11.0

12659. **Δ 28.** Discovered by Dembowski in 1865. "Duplex Cl. I" in O. Arg. N. The only other measure shows no change: 52 6

1902.77	318°.5	4″.61	2*n*	β	9.3...9.4

OΣ 512 (A) and Δ 28 (A)

1874.45	83°.5	363″.51	4*n*	Δ

[Δ (I)...Δ (1736)...β^6...]

12661. **OΣ 513.** Without change. Called OΣ 511 in Ma (XI). 52 14

1869.84	22°.7	3″.44	6*n*	Δ
1880.75	23.6	3.44	2*n*	β
1898.75	21.1	3.63	3*n*	Hu

[Ma (**XI**)...OΣ (**IX**)... Da^3... Δ (I)...WS^2... Hl (*Wash. Obsns.* 1885)... Hl (I, II)...β^3...Hu (*Pub. L. O.* **V**)...]

12664. 27 *Piscium.* **β 730.** Discovered with the 18½-inch. Probably a physical system, since the components have a common proper motion of 0″.094 in the direction of 232°.7 (Auwers). There is very little relative change. 52 32

1879.03	264°.0	1″.40	3*n*	Cin
1879.84	264.4	1.60	2*n*	β
1886.88	269.1	1.78	2*n*	LM
1889.57	267.4	1.50	3*n*	β
1898.66	272.8	1.66	3*n*	Cogshall
1899.83	270.0	1.83	3*n*	Doo

[β (**X**)...β^1...β^3...β (2957)(*Pub. L. O.* **II**)...Cin^5... LM ...Cogshall (*A. J.* 478) ...Doolittle (*Pub. Flower Obsy.* **I**)...]

12666. σ *Cassiopeiae.* **Σ 3049.** (= **H I. 5 = Sh 359**). Without change. The proper motion is small, 0″.018 in 214°.5 (Auwers). 52 55

1869.66	326°.6	2″.85	6*n*	Δ
1886.91	324.2	3.01	3*n*	Hl
1889.80	325.2	3.04	3*n*	HΣ
1902.69	327.4	3.13	1*n*	Hu

[Ma (*F. S.* **I**)...Ma (**X, XI, XIII, XV**)...H^2...Bp...Da^1...Da^2...Da^3...Wr...P^1....Se....Ra (**XXII**)....Δ (*Mem. Accad. Sci.*)....Δ (**I, II**)....Δ (1036, 1196, 1798)...Du...Ba (**II**)...WS...Gl...Pl...Bl (**V**)...Pt...Wellman (*Beob. Berlin*, No. 6, 1892)....Hl (**II**)....Hl (*Wash. Obsns.* 1886)....Glasenapp (**III**)....Knorre (3518)...*Annals Toulouse Obsy.* **III**...HΣ (**XII**)...Espin (*Mon. Not.* **LXIV**, 677)...Lau (4078)...]

53^m 58^s **12667.** **Ho 206.** No motion.

1886.80	193°.0	1″.87	1*n*	HΣ
1893.42	189.1	1.50	3*n*	Ho

[Ho (2779, 3234, 3558)...HΣ (**XII**, p. 126)...]

53 1 **12668.** **A. G. 298.** "Duplex?" in *A. G. Berlin*, but found to be single by Hu (*Bul. L. O.* No. 44), and Miller (A. J. 546).

53 1 **12669.** **Ho 207.** No change.

1900.54	186°.4	3″.38	2*n*	A	7.8...13.0

[Ho (2779)...A (*Bul. L. O.* No. 11)...]

53 8 **12671.** **Doo 22.** (= **Espin 112**). Discovered by Doolittle, at the Flower Observatory, and independently by Espin

1901.99	221°.8	1″.33	4*n*	Es	9.0...9.2

[Doolittle (*Pub. Flower Obsy.* **I**)...Espin (3784)(*Mon. Not.* **LXII**, 533)...]

53 12 **12672.** **β 1154.** Discovered with the 12-inch. The other measures are:

1892.87	129°.7	0″.91	2*n*	Jones
1896.41	308.7	0.82	6*n*	A

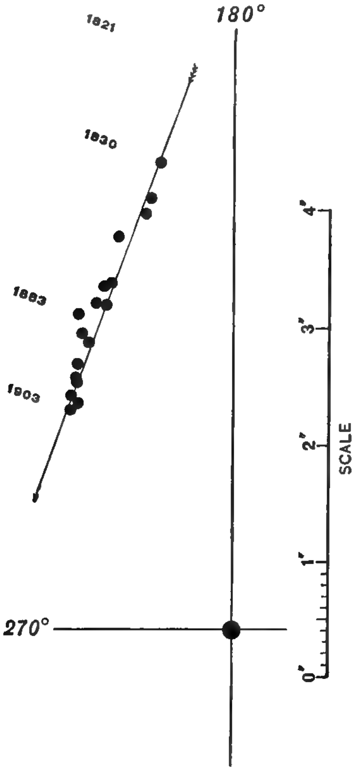
[β (**XVI**)...β (2956)(*Pub. L. O.* **II**)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...A (3396, 3466)...]

53 19 **12674.** **Arg. 46.** "Duplex Cl. III" in O. Arg. S. Measures from Cin^4.

53 23 **12675.** **Σ 3050.** (= **H N. 58 = Sh 360**). *Andromedae* 37. Apparently rectilinear motion. One of the components appears to have an annual proper motion of 0″.026 in 160° (± 180°). There is nothing in the observations to indicate which of the nearly equal stars has this movement. The relative change in the last seventy-five years will be seen from the following:

1821.92	188°.4	5″.26	2*n*	Sh
1830.73	189.0	4.07	2*n*	Da
1832.65	191.0	3.78	3*n*	Σ
1843.81	193.0	3.65	1*n*	Da
1855.49	196.4	3.55	7*n*	Δ
1864.99	199.6	3.17	11*n*	Δ
1868.56	200.7	3.16	3*n*	Du
1871.41	201.3	3.00	8*n*	Δ
1875.70	203.0	3.06	3*n*	Du
1883.77	206.3	3.02	6*n*	En
1886.81	207.3	2.87	2*n*	HΣ
1887.92	206°.8	2″.77	2*n*	Hl
1894.20	210.5	2.66	4*n*	Com
1897.21	212.2	2.57	5*n*	Bowyer
1898.91	212.4	2.55	2*n*	A
1902.64	214.9	2.46	2*n*	Hu
1903.11	214.8	2.37	3*n*	Bowyer
1903.64	216.8	2.36	1*n*	Do

[Ma (*F. S.* **I**)...Ma (324)...Ma (**XI, XIII, XV**)...H^1...H (**VII**)...Bp...Da^1...Da^2...Da^3...Wr...Flm...Se...Se^2...Ba (**II**)...Du...Pt...Δ (*Mem. Accad. Sci.*)...Δ (1036, 1196, 1573)...Δ (**II**)...Gl...WS...WS^2...Sk...Big...En (1674, 2678)...Je (2407)...de Ball (2753)...Do (2199, 3681, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)....Jones (*A. J.* 312)....Hl (**II**)....Glasenapp (**II, III**)....Maw (**I, III**)....Hl (*A. J.* 302)....Giacomelli (**III**)....Collins (*A. J.* 378)(*Proc. Haverford Coll. Obsy.* 1892)...Com (**X**)...Knorre (3300)...Greenwich Obsy.



Σ 3050.

(*Mon. Not.* **LIX**, 400; **LX**, 516; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 807)...A (3585)....HΣ (**XII**)....Lewis (*Obsy.* **XXV**, 403)....Thiele (3837)....Sk^5....Scott (*Mon. Not.* **LXIV**, 52)....Espin (*Mon. Not.* **LXVI**, 142)....Lau (4078) (*Bul. Ast.* **XXII**, 238)...Lohse (*Pub. Potsdam Obsy.*)...]

12677. **β 731.** Discovered with the 18½-inch. The later measures are: 53^m 27^s

1886.80	262°.0	1″.67	4*n*	LM
1888.84	262.1	1.36	2*n*	Lv
1898.70	264.6	1.59	3*n*	A
1898.72	265.8	1.60	3*n*	Cogshall
1900.59	264.1	1.56	2*n*	Doo

[β (**X**)....β^1....LM....Lv^1....A (3585)....Cogshall (*A. J.* 478)....Doolittle (*Pub. Flower Obsy.* **I**)...]

12678. Taken by mistake for H 321 (No. 12654). No other measures. 53 39

[β^5...]

$53^m\ 42^s$ **12680.** Weisse 45. "Duplex" in W^1. Without change.

1898.76	88°.3	1″.94	3*n*	A	8.7...9.5

[Cin^6...A (3585)...]

53 53 **12682.** **β 860.** Discovered with the 15½-inch at the Washburn Observatory. The later measures show no change. Lalande 47049.

1881.83	105°.4	6″.32	2*n*	Ho
1885.82	107.9	6.66	2*n*	HΣ
1888.47	106.4	6.85	4*n*	Com
1898.61	106.7	6.91	3*n*	Doo

[β (XII)....β^4....Ho (2978)....Com (VI)....HΣ (XII)....Doolittle (*Pub. Flower Obsy.* I)...]

53 57 **12683.** **Hn 59.** The later measures are:

A and B

1888.73	11°.2	1″.14	5*n*	Com

AB and C

1888.41	307°.4	19″.42	2*n*	Com

[β^4...Com (VI)...]

54 16 **12686.** **A. G. 299.** Noted in *A. G. Cambridge*, as a "close double". Examined three times with the 40-inch in 1901. On the last occasion 85 *Pegasi*, which is close by, was easily measured. At no time was there any indication of this star being a double of any kind.

54 18 **12687.** **β 732.** Discovered with the 18½-inch. Without change. The *n* star of a wide pair.

1891.87	152°.9	5″.95	2*n*	β
1898.57	151.8	5.84	3*n*	Doo
1898.84	151.7	5.95	1*n*	β

[β (X)....β^1....β (3114)(*Pub. L. O.* II)(*Pub. Y. O.* I)....Doolittle (*Pub. Flower Obsy.* I)...]

54 19 **12689.** **H 3231.** Nothing since 1830 but the following:

AB	1905.49	282°.8	19″.46	1*n*	β^6	9.8...12.5
AC	1905.49	296.7	41.94	1*n*	β^6	...10.0

54 59 **12691.** **OΣ (App) 253.** Without change.

1881.65	353°.5	100″.65	3*n*	β
1905.74	353.8	100.35	2*n*	β

[Δ (I)...β^4...Franz (2650)...β^6...]

55 8 **12693.** **OΣ (App) 254.** The principal star is the variable, U *Cassiopeiae* of Gore's *Catalogue*. The period has not been well determined. It is No. 280 of Schjellerup's *Catalogue of Red Stars*. No material change in the position of the companion.

1881.65	89°.5	58″.84	3*n*	β
1905.52	89.5	58.47	2*n*	β

[Δ (I)...Bl (V)...β^4...Franz (2650)...Espin (*Mon. Not.* LXII, 533)...β^6...]

$55^m\ 11^s$ **12694.** First measured by Duner in 1869. Only the following since:

1900.66	264°.3	15″.07	2*n*	β	9.0...9.5

[Du (p. 162)...β^5...]

55 12 **12695.** **H 1925.** Later measures:

1905.49	337°.9	16″.38	1*n*	β^6	9.8...10.5

55 17 **12696.** **Hn 60.** This appears to be a system in rapid motion. The following are all the measures:

1881.71	124°.1	0″.62	3*n*	β
1888.17	105.0	0.54	2*n*	Com
1893.13	91.1	0.21	1*n*	Com
1902.62	345.5	0.45	1*n*	β
1905.68	331.4	0.28	2*n*	β

[β^4...Com (VI, X)(*Sid. Mess.* IX, 78)...β^6...]

(See p. 1086)

55 21 **12697.** **Ho 208.** No other measures.

[Ho (2779)...]

55 42 **12699.** **Hu 798.** The only measures are:

1904.60	289°.9	1″.77	3*n*	Hu	9.2...10.4

[Hu (*Bul. L. O.* No. 65)...]

55 45 **12700.** **β 482.** Discovered with the 6-inch. No material change. In DM 8.9m. The other measures are:

A and B

1877.23	342°.6	4″.07	2*n*	Δ
1880.74	341.6	4.28	1*n*	β
1898.56	343.0	4.75	2*n*	Doo

A and C

1880.74	125°.9	9″.46	1*n*	β
1898.56	122.9	9.96	2*n*	Doo

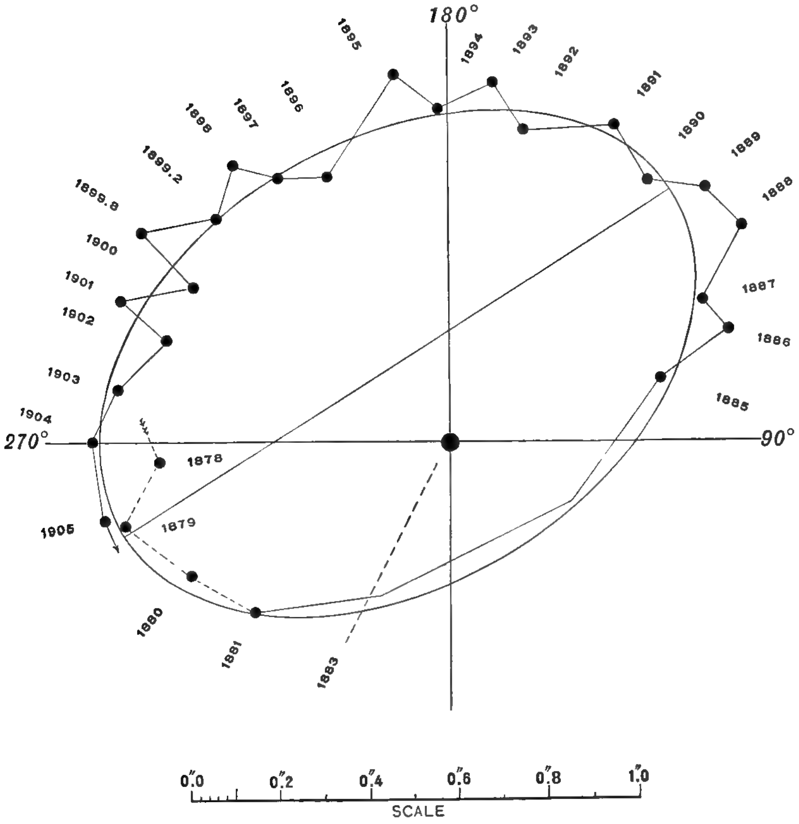
[β (IX)...β (*Mon. Not.* XXXVIII, 78)...β^3...β (2875) (*Pub. L. O.* II)...Δ (I)...Doolittle (*Pub. Flower Obsy.* I)...]

55 54 **12701.** 85 *Pegasi*. **β 733.** One of the most important and most interesting of the known binary systems. The shortness of its period, the rapid movement in space of both components, the relative nearness of this system to our own, and the extreme inequality in magnitude and closeness of the stars, all combine to give this a leading place among the binary stars. It is at all times an object of considerable difficulty, and the reliable observations will necessarily be confined to the larger retractors. It is an excellent test for the definition of any object glass, however large, and no instrument, whatever its aperture, can deal with a pair of this class unless the figure of the objective will compare favorably with the Alvan Clark standard.

The close companion was discovered with the 18½-inch of the Dearborn Observatory while measuring the 9m optical companion. One revolution has been completed since the first measures in 1878. The period cannot differ much from 26 years. If it can be followed with the micrometer through the first quadrant, which seems probable with the large refractors, the errors in the elements of the orbit will be much reduced. So far the investigations can only give provisional results.

The system has a very large proper motion, and its value is known with extreme accuracy from micrometrical measures of the distant companion. The principal results, including some from meridian observations, are:

Argelander	1″.390 in 135°.1
Madler	1.376 in 133.3
Brunnow	1.259 in 133.6
Schaeberle	1.305 in 140.3



85 Pegasi. AB.

Gore	1″.221 in 141°.2
O. Struve	1.289 in 139.2
Burnham	1.286 in 139.5
Auwers	1.288 in 139.7
Porter	1.287 in 138.9

Four orbits have been computed of this pair. The dates of the last measures made use of, and the periods are:

1888	Schaeberle	22.3 yrs.	*A. J.* 185
1892	Glasenapp	17.49	*A. N.* 3145
1895	See	24.0	*Evolution of the Stellar Systems*
1899	Burnham	25.7	*Pub. Y. O.* I

The following are all the measures of the close pair. The positions marked (*) are shown on the diagram.

1878.73*	274°.0	0″.67	3*n*	β
1879.46*	284.6	0.75	5*n*	β
1880.59*	298.3	0.65	5*n*	β
1880.79*	297.2	0.66	3*n*	Hl
1881.54*	311.5	0.58	1*n*	β
1882.62	(89.4)	0.64	1*n*	OΣ
1883.75*	333±	....	1*n*	β
1885.93*	107.0	0.5±	1*n*	HΣ
1886.81*	115.0	0.68	2*n*	HΣ
1886.90*	109.7	0.79	3*n*	Hl
1886.98*	111.0	0.58	1*n*	Sp
1887.91*	119.3	0.66	1*n*	Sp
1888.69*	126.7	0.95	5*n*	β
1888.95*	124.1	0.83	3*n*	Hl
1888.96*	128.3	0.70	7*n*	Sp
1889.59*	134.7	0.94	5*n*	β
1889.81*	132.2	0.82	1*n*	HΣ
1889.90*	137.0	0.70	5*n*	Sp
1890.55*	139.0	0.78	4*n*	β
1890.96*	146.4	0.71	6*n*	Sp
1891.56*	151.8	0.79	3*n*	β
1891.94*	152.8	0.83	2*n*	Sp
1892.88*	165.4	0.73	1*n*	Barnard
1892.97*	167.3	0.73	4*n*	Sp
1893.64*	168.3	0.90	2*n*	Schaeberle
1893.92*	174.0	0.88	3*n*	Barnard
1893.96*	176.1	0.69	6*n*	Sp
1894.53*	178.6	0.84	5*n*	Barnard
1894.59*	181.3	0.89	4*n*	Schaeberle
1894.93*	188.6	0.65	2*n*	Sp
1894.98*	177.6	0.65	2*n*	Lewis
1895.53	191.2	1.02	4*n*	Sehaeberle
1895.64*	190.5	0.83	10*n*	Barnard
1895.71*	185.8	0.86	6*n*	A
1895.73	198.4	0.73	2*n*	See
1895.74	204.8	0.7±	1*n*	Moulton
1895.86	196.3	0.47	2*n*	Lewis
1896.04*	201.6	0.73	6*n*	Sp
1896.75*	200.8	0.54	3*n*	A
1896.81*	205.5	0.76	3*n*	Schaeberle
1896.86*	208.6	0.60	2*n*	Hu
1896.87	208.0	0.8	5*n*	Gl
1897.59*	212.5	0.79	8*n*	Schaeberle
1897.64	223.3	0.7	4*n*	Gl
1897.70	207.5	0.89	1*n*	Do
1897.72*	209.9	0.70	3*n*	A
1897.75*	209.9	0.74	4*n*	Hu
1897.94	228.2	0.83	1*n*	Doo
1897.96*	218.0	0.61	3*n*	Sp
1897.97	216.1	0.76	1*n*	Lewis
1898.44*	217.5	0.79	3*n*	A
1898.80	225.5	0.59	2*n*	Lewis
1898.82	234.4	0.7	8*n*	Gl
1898.94*	225.8	0.67	3*n*	Sp
1899.51*	225.6	0.78	4*n*	A
1899.80*	234.6	0.83	2*n*	Brown
1899.81*	237.5	0.82	1*n*	See
1899.82*	233.1	0.84	2*n*	Doo
1899.93*	236.2	0.85	2*n*	A
1900.59*	238.6	0.67	3*n*	A
1901.51*	246.9	0.77	1*n*	A
1901.59*	239.6	0.66	3*n*	Lewis
1901.85*	253.0	0.97	1*n*	β
1902.81*	250.4	0.59	1*n*	Doo
1902.91*	249.7	0.75	1*n*	Lewis

1903.54*	262°0	0″76	3*n*	A
1903.71*	259.8	0.74	3*n*	Doo
1904.00	281.1	0.77	1*n*	Biesbroeck
1904.48*	269.8	0.80	2*n*	A
1905.68*	282.0	0.72	2*n*	A
1905.72*	283.7	0.87	1*n*	β

A and C

1851.96*	114°1	33″03	1*n*	OΣ
1852.67*	113.9	32.60	1*n*	OΣ
1865.91*	92.1	18.89	1*n*	OΣ
1868.77*	82.4	17.03	1*n*	OΣ
1869.98*	77.8	16.13	20*n*	Bru
1870.65*	74.4	15.47	25*n*	Bru
1874.66*	54.4	13.92	1*n*	OΣ
1876.77*	40.3	14.02	1*n*	OΣ
1877.94	39.8	14.0	1*n*	Flm
1878.54*	33.6	14.40	4*n*	β
1878.74	32.8	14.76	1*n*	Δ
1879.27*	30.4	14.96	8*n*	β
1880.57*	25.0	15.41	4*n*	β
1881.54*	20.8	16.29	4*n*	β
1881.88	19.8	16.54	1*n*	Big
1882.62	15.2	16.98	1*n*	OΣ
1882.77*	17.1	17.34	3*n*	β
1883.54	11.3	17.34	1*n*	Seagrave
1886.24*	7.6	19.84	3*n*	HΣ
1886.99	6.1	21.15	3*n*	Eng
1888.67*	0.9	21.71	5*n*	β
1889.50*	358.7	22.66	4*n*	β
1889.82	358.4	22.70	2*n*	Lv
1890.52*	356.7	23.59	3*n*	β
1891.56*	354.7	24.58	3*n*	β
1891.94*	354.3	25.02	8*n*	β
1895.06	350.0	28.86	1*n*	Lewis
1895.68*	348.7	29.27	3*n*	A
1896.75*	347.8	30.48	2*n*	A
1897.56*	346.1	31.49	2*n*	A
1897.82*	345.7	31.74	2*n*	β
1898.49*	344.4	32.53	3*n*	β
1898.69*	344.5	32.90	2*n*	A
1899.81	342.8	34.20	1*n*	Lohse
1900.66*	342.9	35.15	3*n*	A
1900.68	340.2	35.01	1*n*	Solá
1901.86*	342.3	36.60	2*n*	β
1903.44*	340.6	38.58	1*n*	A
1904.49*	340.1	39.79	4*n*	β
1905.68*	339.6	41.50	2*n*	A
1905.69*	339.2	41.48	4*n*	β

The twenty-seven selected positions shown on the diagram give for the most probable value of the proper motion of 85 *Pegasi:*

1″2855 in 139°50

As these observations extend over a period of more than half a century, the proper motion should be known as accurately as that of any star in the heavens. The observations of the distant star D tend to show that C has no sensible proper motion of its own.

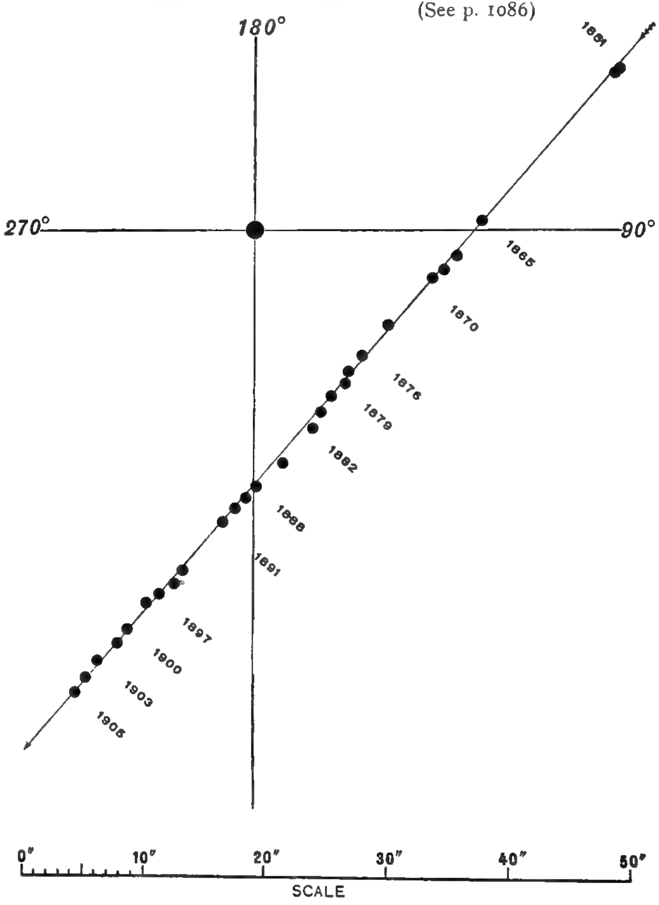
A and D

1878.96	277°1	61″73	1*n*	β
1880.56	278.0	64.25	1*n*	β
1888.69	283.8	72.02	1*n*	β
1891.90	285.4	75.09	4*n*	β
1897.56	288°0	81″89	2*n*	A
1897.82	288.0	82.54	2*n*	β
1898.47	288.4	83.29	2*n*	β
1898.69	288.5	83.86	2*n*	A

The measures of this star give 1″308 in 137°1 for the proper motion of A.

[β (**X**)....β1....β3....β4....β (2319, 2334, 2875, 2957, 3048, 3114)(*Pub. L. O.* **II**).... β (*A. J.* 246)...Hl (**II**)...OΣ (**X**, pp. 119, 146)...Sp (**III**)...Barnard (*A. J.* 447) ...Schaeberle (*A. J.* 185, 246, 323, 391, 420)...Do (3466)...Glasenapp (3145)... Hu (*A. J.* 397, 427)...Com (*Astrophysical Jour.* **XVII**, 220)...See (3339)(*A. J.* 359, 378)(*Evolution of the Stellar Systems*)....Greenwich Obsy. (*Mon. Not.* **LVI**, 359; **LIX**, 400; **LXII**, 399; **LXIII**, 403)....HΣ (**XII**).... Brown (3646).... Gl (*Mon. Not.* **LXI**, 556)...Doolittle (*A. J.* 416)(*Pub. Flower Obsy.* **I, II**)... Biesbroeck...A (3466, 3585, 3639)(*A. J.* 429)(*Ast. Soc. Pac.* **VII**, 305; **XV**, 217) (*Bul. L. O.* No. 11)...β5...β6...]

(See p. 1086)



85 Pegasi. AC.

The following relate to the distant star C:

[Brunnow (*Dunsink Obsns.* Part 2)(*Viert. der Astron. Gesell.* **IX**, 38)...Argelander (*Beob. Sternwarte zu Bonn* **VI**)...Flammarion (*Etoiles Doubles et Multiples*)(*Sid. Mess.* **III**, 213)(*L'Astronomie* **III**, 176).... Engelhardt (*Obsns. Astron.* **II**)...Big...Seagrave (*Sid. Mess.* **II**, 258)...Δ (**I**)...Gore (*Mon. Not.* **XLIX**, 361)...Lv (*A. J.* 382)(*Proc. Haverford Coll. Obsy.* 1891)...Com (**X**)... Solá (3679)...HΣ (**XII**)...Everett (*Mon. Not.* **LVI**, 464)...]

12702. **H** 5440. Probably without change. Measures from H3. 56m 7s

1877.47	285°8	3″67	3*n*	Cin	8.0...8.2
1885.79	287.2	3.52	2*n*	W	8.0...8.5

[H3...WJ...Cin3...Cin4...Wilson (Cin 10)...]

$56^m\ 12^s$ **12703.** **Ho 209.** The late measures are:

AB	1894.22	355°5	1″10	3*n*	Ho
AC	1894.22	141.2	18.43	3*n*	Ho

[Ho (2779, 3234, 3558)...]

56 27 **12704.** **Σ 3053.** (= **S 837**). No change. The proper motion of the large star is given:

A. G. Chris.	0″034 in 190°4
Schroeter	0.015 in 180

1868.67	70°4	15″18	5*n*	Δ
1902.69	70.1	15.38	1*n*	Hu
1905.57	70.7	15.03	1*n*	Lau

[Ma (*F. S.* **II**) ... Ma (**XIII**) ... H (**IV**)...Wr.. Ra (**XXIII**)...*Gr. Obsns.* 1840.... Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)... Δ (**I, II**)... Espin (*Brit. Ast Ass'n.* **III**, 228)(*Mon. Not.* **LXIV**, 677)... Lau (4078)...]

56 34 **12706.** **Σ 3051.** Fixed.

1876.89	23°3	16″90	15*n*	Δ
1879.10	22.8	16.92	9*n*	Hl
1905.86	23.7	16.80	2*n*	β

[Ma (*F. S.* **II**)....Ma (**XI**)....OΣ (**X**).... Δ (**I**, p. 409)(**II**)....Cin^5....En (2662).... Hl (**I**, p. 25)...Glasenapp (**II**)...β^6...]

56 36 **12707.** **Arg. 47.** (= **Espin 39**). "Duplex" in O. Arg. N. Measures by Espin.

1905.90	290°3	9″98	2*n*	β

There is a similar pair near this, 32°0 *p* and 0′7 *s*, not given in Part I. This is DM (59°) 2815:

1905.79	247°9	12″87	1*n*	β

[Espin (3717)(*Ast. and A.-P.* **XII**, 282)(*Brit. Ast. Ass'n.* **III**, 228)...β^6...]

56 37 **12708.** **Ho 622.** A later position is:

1902.72	86°7	23″89	4*n*	Doo

[Ho (3558)...]

56 38 **12709.** **β 281.** (AC = **H 998**). Discovered with the 9.4-inch at the Dartmouth College Observatory. The binary character of the close pair is established by the measures. The motion is retrograde, with perhaps a slow increase in the distance. The system has a proper motion of 0″079 in the direction of 154°1 (Boss). This movement is in the direction opposite the Herschel companion, and the distance of that star is therefore increasing annually by the proper motion of AB. At one time these stars must have formed a close pair.

The following are all the measures:

A and B

1877.82	217°0	1″12	2*n*	β
1881.73	212.6	1.25	2*n*	β
1885.97	203.7	1.20	1*n*	HΣ
1888.89	209.0	1.35	1*n*	Lv
1891.61	208.8	1.25	3*n*	β
1893.46	207.9	1.06	6*n*	Sp
1897.96	203.3	1.53	1*n*	Lewis
1898.73	203.2	1.53	3*n*	A
1898.85	199.8	1.38	4*n*	β
1902.92	197.6	1.39	1*n*	Lewis
1903.57	198.1	1.45	5*n*	Doo

A and C (= H 998)

1825	330° ±	25″ ±	1*n*	H
1877.82	335.8	30.44	2*n*	β
1881.73	336.7	30.85	2*n*	β
1885.97	334.3	31.20	1*n*	HΣ
1891.61	334.6	31.82	3*n*	β
1898.70	334.4	32.24	2*n*	A
1898.86	334.4	32.63	3*n*	β

The measures of C give 0″095 for the proper motion of A.

[β (**V**)...β (*Mon. Not.* **XXXV**, 31)...β^1...β^4...β (3114)(*Pub. L. O.* **II**)...Sp (**III**)...Lewis (*Mon. Not.* **LIX**, 400; **LXIII**, 403)....A (3585)....HΣ (**XII**)....Doolittle (*Pub. Flower Obsy* **II**)...]

12710. **Hu 799.** The recent measures are: $56^m\ 41^s$

1904.58	292°3	0″64	2*n*	Hu	9.4...9.8

[Hu (*Bul. L. O.* No. 65)...]

12711. **A 800.** With later measures (*Bul. L. O.* No. 61): 56 43

1904.52	285°6	1″42	3*n*	A

12712. **Σ 3052.** Unchanged. 56 47

1866.61	8°1	33″74	3*n*	Δ
1902.69	7.6	33.98	1*n*	Hu

[H (**V**)...Ma (*F. S.* **II**)... Δ (**II**)...Do (3023)(*Trans. R. I. Acad.* **XXIX**, Part 13)...Cin^5...Cin^6...Glasenapp (**II**)...Lau (4078)...]

12713. **H 999.** The only measure: 56 48

1905.62	79°2	27″72	1*n*	β^6

12714. **Weisse 46.** "Duplex" in W^1. No near companion seen with the 40-inch in 1901. 56 49

[β^5...]

12715. **Σ 3054.** Unchanged. 56 55

1865.94	181°0	33″85	4*n*	Δ
1905.61	181.5	33.73	2*n*	β

[Ma (*F. S.* **II**)... Δ (**II**)...*Annals Toulouse Obsy.* **III**...β^6...]

12716. **β 861.** Discovered with the 15½-inch at the Washburn Observatory. Unchanged. 56 55

1887.80	177°8	1″78	2*n*	Com
1902.74	177.2	1.39	6*n*	Doo

Doolittle measures a 13 m star, not previously observed:

1902.77	46°1	16″38	1*n*	Doo

[β (**XII**)...β^4...Com (**VI**)...Doolittle (*A. J.* 547)(*Pub. Flower Obsy.* **II**)...]

12717. **H 3233.** The third star, referred to by H, is 9 m, 330°6 : 79″8 (1905). 56 56

1905.60	209°7	12″68	1*n*	β^6	9.5...10.0

57^m 8^s **12721.** **H 3234.** "The first of a long serpentine line of six stars. The second of this line is Σ 3059". Examined twice with the 6-inch; the small star C and the components of Σ 3059 well seen, but not B (1876). The 40-inch shows nothing nearer than C.

1904.76 42°9 19″29 1*n* β^6 9.0...12.5

57 42 **12723.** **A 429.** (AC = **H 1929**). The principal component of H 1929 was found to be a close pair by Aitken with the 36-inch in 1902. No other measures of this. No change in Herschel's companion.

AB and C

1830	287°5	3″±	1*n*	H
1875.65	289.6	4.94	4*n*	Δ
1902.86	288.9	4.97	3*n*	A

[Δ (I)...A (*Bul. L. O.* No. 29)...]

57 51 **12724.** **Σ 3055.** No change.

1865.90	359°4	5″55	3*n*	Δ
1878.62	359.6	5.79	1*n*	β
1905.61	359.7	5.55	2*n*	β

[Ma (*F. S.* I)...Ma (**XI**)...Δ (**II**)...β^1...β^6...]

57 54: **12725.** **H IV. 69.** "Place from description". I could not find this in 1876. There is certainly a mistake in the place. With an error of 1° declination, it would be identical with Σ 3064 *rej.* (No. 8). The descriptions agree.

58 3 **12727.** 9 *Cassiopeiae.* The proper motion is 0″027 in 259°5 (*A. G. Hels*). The only measure since 1824 is:

1904.74 196°1 246″31 1*n* β^6

The *A. G.* positions give, 196°1 : 246″5 (1877.0).

58 27 **12729.** **OΣ 514.** Without change. Called OΣ 512 in Ma (XI) and OΣ 511 by Doolittle.

1867.29	168°4	5″17	4*n*	Δ
1881.85	163.7	5.05	2*n*	Ho
1898.75	168.5	5.41	3*n*	Hu
1902.14	167.7	5.59	3*n*	Doo

[Ma (**XI, XIII**)...OΣ (**IX**)...Δ (**I**)...Ho (2978)... Hu (*Pub. L. O.* **V**)... Doolittle (*Pub. Flower Obsy.* **II**, p. 181)...]

58 30 **12730.** **Hu 800.** With another measure the mean is:

1904.55 70°5 0″22 2*n* Hu

[Hu (*Bul. L. O.* No. 65)...]

58 30 **12731.** **Σ 3056.** Perhaps a little retrograde motion.

A and B

1831.32	158°2	0″55	5*n*	Σ
1841.11	155.0	0.57	2*n*	OΣ
1853.70	146.8	0.57	2*n*	OΣ
1867.95	151.4	0.6±	7*n*	Δ
1880.72	146.7	0.63	4*n*	Sp
1887.92	152.1	0.53	2*n*	Hl
1894.70	150.0	0.51	1*n*	Gla
1900.99	148.0	0.53	9*n*	Bryant
1904.57	149.3	0.67	2*n*	Hu

The change in C is evidently from proper motion.

AB and C

1831.64	355°4	20″48	5*n*	Σ
1853.70	356.1	21.04	2*n*	OΣ
1866.15	356.5	21.46	6*n*	Δ
1881.99	357.6	22.09	2*n*	Sp
1887.92	357.5	22.19	2*n*	Hl
1894.70	358.6	22.32	2*n*	Gla
1903.64	358.8	22.74	1*n*	Do
1904.46	358.2	22.83	1*n*	Hu

These measures give 0″036 in 205°7 for the most probable proper motion of AB.

[Ma (*F. S.* **I**, 41, 64)...Ma (**IX, X, XI**)...H (**IV, VII**)...Se (*Comp. Rend.* **XLVIII**, 375)...Se...Flm...OΣ (**IX**)...Δ (1573)... Δ (**II**)...Sp (**II**)...Per...Per (2560) ...En (2678)...Hl (**II**)...Glasenapp (**III**)...Big (*Bul. Ast.* **XII**, 299)...Greenwich Obsy. (*Mon. Not.* **LIX**, 400; **LX**, 516; **LXI**, 486; **LXII**, 383; **LXIII**, 403; **LXIV**, 807)...Do (3681)...HΣ (**XII**)...]

12732. **β 862.** Discovered with the 15½-inch at the Washburn Observatory. Apparently slow motion in angle. 58^m 36^s

1881.74	104°9	0″54	2*n*	β
1888.32	107.5	0.55	2*n*	Com
1899.57	115.5	0.50	3*n*	A
1901.04	(314.3)	0.58	1*n*	Lewis

[β (**XII**)...β^4...Com (**VI**)...A (3639)...Lewis (*Mon. Not.* **LXII**, 383)...]

12734. **A 203.** No other measures. 58 42

[A (3741)(*Bul. L. O.* No. 3)...]

12735. **Σ 3057.** Fixed. The proper motion of the principal star is 0″041 in 180° (*A. G. Hels*). 58 43

1868.53	300°3	3″67	4*n*	Δ
1889.57	300.1	3.66	3*n*	β
1905.86	299.9	3.63	3*n*	β

[Ma (*F. S.* **I**)...Ma (**XI, XIII**)...H^1...H^2...H (**IV**)...Wr. OΣ (**IX**)...Pl...Kn ...Sk....T (2899)....Δ (**II**)....Jones (*Proc. Haverford Coll. Obsy.* 1892).... β (2957)(*Pub. L. O.* **II**)...Hu (*A. J.* 397)...β^6...]

12736. **β 997.** Discovered with the 18½-inch. Probably no motion. The last measures of Hall are erroneously credited to OΣ 547, which is in the field 8′ *n* and 26ˢ *f*. The other measures are: 58 47

1879.80	340°2	4″25	2*n*	Hl
1885.76	340.8	4.08	3*n*	Hl
1891.72	340.7	4.29	2*n*	Hl
1895.69	339.8	4.12	3*n*	A
1895.84	338.0	4.09	1*n*	Com
1898.75	338.9	4.22	3*n*	Hu
1900.59	338.3	4.11	3*n*	Doo
1906.07	337.7	4.13	2*n*	β

DM (44°) 4550 (6.3), which is 24′ *s*, has a companion not previously measured. This is Groombridge 4223.

1906.08 235°5 21″49 3*n* β 7.5...9.4

The place of this star, not given in Part I, is:

R. A. = 23^h 59^m 0^s
Decl. = 44° 33′ 41″

The proper motion is 0″031 in 185°9 (Greenwich).

[β (**XIII**)...β^3...Hl (**I, II**)...A (*Ast. Soc. Pac.* **VII**, 305)...Com (**X**)...Hu (*Bul. L. O.* No. 44)...Doolittle (*Pub. Flower Obsy.* **I**)...β^6...]

58^{m} 55^{s} **12738.** **Σ 3059.** Change in angle.

1867.36	332°9	2″31	1*n*	Δ
1881.67	331.4	2.09	3*n*	β
1903.64	326.8	2.27	2*n*	Hu
1904.75	329.0	2.00	2*n*	β

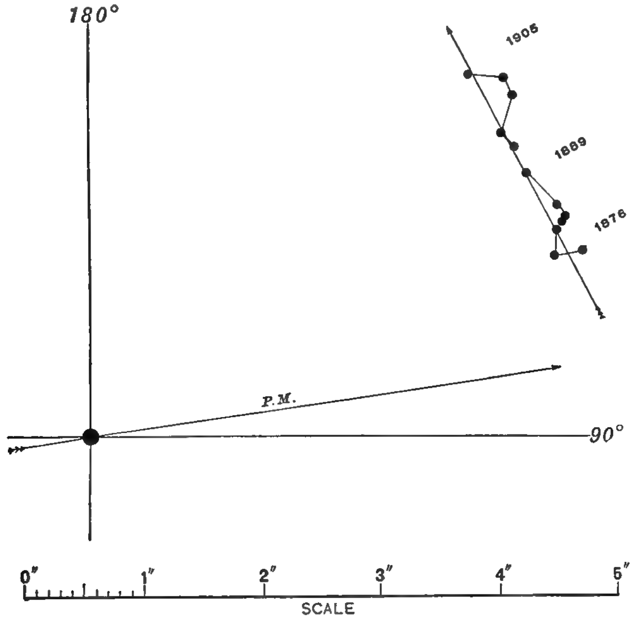
[H (V)...Ma (*F. S.* II)...Δ (II)...$β^4$...$β^6$...]

59 0 **12739.** **Σ 3058.** No change.

1866.55	51°4	12″50	3*n*	Δ
1905.93	50.9	12.64	2*n*	β

[Ma (*F. S.* I)...Ma (XI)...H (IV)...Δ (II)...*Annals Toulouse Obsy.* III...HΣ (XII)...$β^6$...]

59 12 **12740.** **OΣ 547.** This appears to be a system of the 61 *Cygni* type, the relative change being due to a small difference in the two large proper motions. So far there is no departure from rectilinear motion. The proper motion from meridian positions is given:



OΣ 547.

Stumpe	0″897 in 98°7
Porter	0.887 in 98.4
Paris	0.929 in 97.9

The observations in Hl (II) belong to β 997. The following are all the measures:

1876.07	110°9	4″49	3*n*	OΣ
1876.29	111.3	4.24	4*n*	Δ
1879.81	113.9	4.35	2*n*	Hl
1880.73	114.9	4.47	4*n*	β
1881.72	114.5	4.42	2*n*	Big
1882.70	116.4	4.55	1*n*	OΣ
1889.82	121.1	4.35	2*n*	HΣ
1895.68	124.3	4.38	3*n*	A
1895.88	126.5	4.36	3*n*	Com
1898.75	129.0	4.62	3*n*	Hu
1901.66	130.9	4.67	1*n*	Hu
1905.93	133.8	4.47	4*n*	β

The foregoing measures give for the apparent motion of B:

0″0595 in 207°0

Therefore, with a mean of the several values of the movement of A from meridian observations, we have for the proper motions of the components:

A = 0″904 in 98°3
B = 0.888 in 102.9

[OΣ (IX, X, p. 200)...Δ (I)...Big...Hl (I)...β (2363)...$β^3$...A (*Pub. Ast. Soc. Pac.* VII, 305)...Com (X)...HΣ (XII)...Hu (*Pub. L. O.* V)...$β^6$...]

12741. **OΣ (App) 255.** Unchanged. 59^{m} 14^{s}

1905.55	336°8	89″14	2*n*	β

[Δ (I)...Franz (3464)...$β^6$...]

12742. **Ho 490.** The only later measure is: 59 19

1905.99	166°7	21″69	2*n*	β

[Ho (3234)...$β^6$...]

12744. **H 3237.** The only measure is: 59 32

1905.79	311°8	29″73	1*n*	$β^6$	9.5...12.0

12745. **A 110.** No other measures: 59 33

[A (3741)(*Bul. L. O.* No. 3)...]

12746. **Σ 3061.** Unchanged. 59 35

1865.74	146°9	7″44	3*n*	Δ
1881.88	147.2	7.77	4*n*	Hl
1903.85	148.4	7.90	1*n*	Lewis

[Ma (*F. S.* I)...Ma (X, XI)...H^1...H^2...H (VII)...Bp...Da^1...Da^2...Da^3...Wr...Ba (II)...Ra (XXIV)...Se...Se^3...Δ (1196)...Δ (I, II)...Pl...WS...Gl...Do (2199, 2242)(*Trans. R. I. Acad.* XXIX, Part 13)...Hl (*Wash. Obsns.* 1884, 1886)...Hl (I, II)...Jones (*Proc. Haverford Coll. Obsy.* 1892)...Glasenapp (II)...Chofardet (3450)...*Annals Toulouse Obsy.* III...Lewis (*Mon. Not.* LXIV, 789)...]

12747. **β 863.** Discovered with the 15½-inch at the Washburn Observatory. Change? 59 42

1888.02	121°6	1″98	4*n*	Com
1898.68	119.3	2.03	3*n*	A

[β (XII)...$β^4$...Com (VI)...A (3585)...]

(See p. 1086)

12748. **H 5441.** There is nothing in this place (1875). There is no doubt of an error of 1° in the Declination of H, making it identical with H 3236. (See No. 12754). 59 43

12750. **Σ 3060.** Change in angle. The proper motion is 0″262 in 229°7 (Battermann). The relative motion is apparently rectilinear. 59 47

1830.52	110°5	3″93	3*n*	Σ
1846.52	112.7	3.75	4*n*	Ma
1857.24	114.3	3.56	3*n*	Se
1866.01	115.8	3.54	3*n*	Δ

1878.85	117°5	3″67	3*n*	Hl
1884.94	118.2	3.54	2*n*	Hl
1887.33	118.4	3.50	2*n*	HΣ
1892.83	118.4	3.50	2*n*	Gla
1902.86	120.2	3.73	2*n*	Do
1904.95	121.6	3.72	2*n*	Bowyer

[Ma (*F. S.* **I**)...Ma (**X**, **XII**, **XV**)...Se...Wr...Do (2242, 3023, 3931)(*Trans. R. I. Acad.* **XXIX**, Part 13)....Flm....Δ (**II**)....de Ball (2753)....Hl (**I, II**)....Hl (*Wash. Obsns.* 1885)....Jones (*Proc. Haverford Coll. Obsy.* 1892)....Glasenapp (**II**).... *Annals Toulouse Obsy.* **III** .... HΣ (**XII**).... Lewis and Bowyer (*Mon. Not.* **LXIV**, 789; **LXVI**, 19)...]

59m 48s **12751.** **See** 1. Discovered by Cogshall.

1899.37	323°0	4″63	3*n*	Cogshall

[See (*A. J.* 431)...Cogshall (*A. J.* 505)...]

59 49 **12753.** **Kr 67.** Double in *A. G. Hels.*

1899.29	159°7	3″16	5*n*	Doo

[β (3042)(*Pub. L. O.* **II**)...Espin (3717)...Doolittle (*Pub. Flower Obsy.* **I**)...]

59 49 **12754.** **H 3236.** (= **H 5441**). There is an error of 1° in the Declination of H 5441. (See No. 12748).

59 57 **12755.** **Σ 3062.** (= **H I. 39** = **H 1934**). More than one revolution has been made since the discovery of this binary system by Herschel in 1782. By two observations he gave the position-angle 319°3 (1782.85). If this measure was substantially correct, the period would necessarily be about 106 years. This position has been used by all the computers, but all the early measures preceding the time of Struve are more or less uncertain, and little use can be made of them until they are verified by modern measures, and then they are no longer needed.

The system has a considerable proper motion:

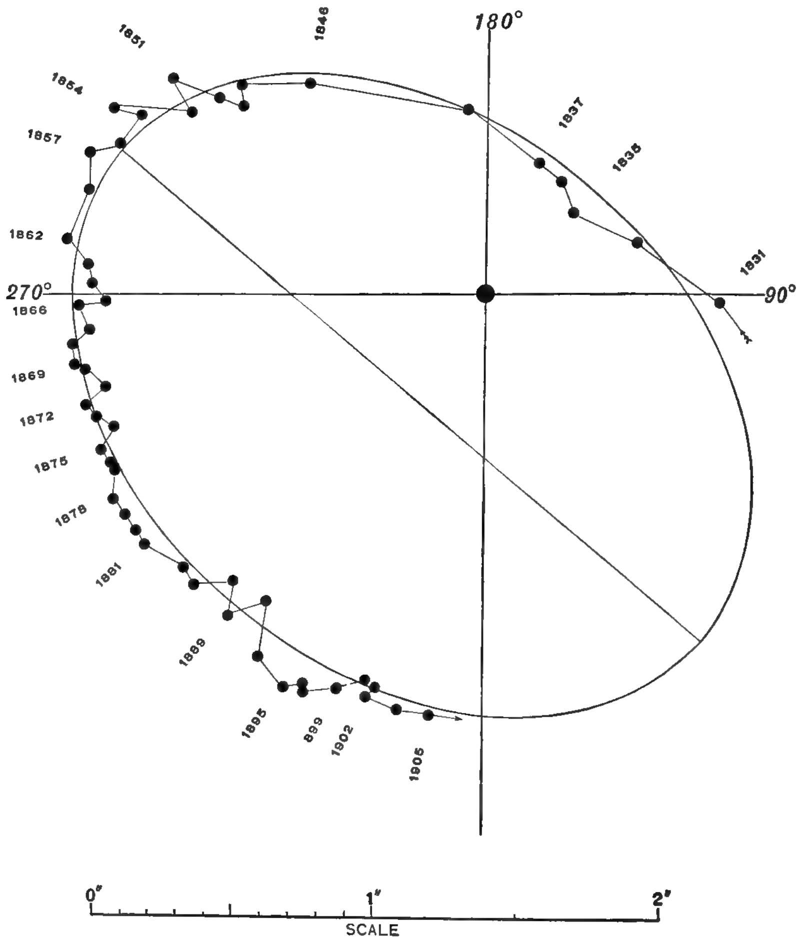
A. G. Hels.	0″266 in 82°7
Paris	0.319 in 82.4

The following orbits have been found, using measures to the years given:

1841	Madler	94.76 yrs.	*Dorp. Obsns.* IX
1846	Madler	146.83	*Die Fixst. Syst.*
1865	Schur	112.64	*A. N.* 1636
1867	VonFuss	105.64	*Mel. Math. et Ast.* IV 1867
1875?	Doberck	104.41	*A. N.* 2156
1877	Doberck	102.94	*A. N.* 2277
1895	See	104.61	*Evolution of the Stellar Systems*
1900	Larson	114.15	*A. J.* 506

The following selected measures by the best observers are shown on the diagram:

1831.71	87°5	0″82	2*n*	Σ
1833.71	108.6	0.56	3*n*	Σ
1835.66	132.6	0.41	5*n*	Σ
1836.61	146.4	0.47	5*n*	Σ
1837.78	157.9	0.49	3*n*	Σ
1840.32	186.5	0.65	4*n*	OΣ
1846.42	220.3	0.97	2*n*	OΣ
1848.22	229.7	1.14	2*n*	OΣ
1849.19	232.5	1.09	3*n*	OΣ
1850.04	233.9	1.17	3*n*	OΣ
1851.16	235°7	1″35	2*n*	OΣ
1852.49	238.4	1.23	3*n*	OΣ
1854.11	243.5	1.48	4*n*	OΣ
1855.05	242.7	1.38	3*n*	OΣ
1856.66	247.8	1.40	2*n*	OΣ
1857.37	250.4	1.50	3*n*	OΣ
1859.16	255.3	1.46	3*n*	OΣ
1862.18	261.7	1.54	2*n*	OΣ
1862.79	263.6	1.46	11*n*	Δ
1863.80	266°0	1″42	9*n*	Δ
1864.73	268.7	1.40	7*n*	Δ
1865.70	271.2	1.35	6*n*	Δ
1866.20	270.4	1.47	2*n*	OΣ
1866.74	273.4	1.44	5*n*	Δ
1867.74	275.2	1.41	7*n*	Δ
1868.67	277.5	1.38	4*n*	Δ
1868.98	276.5	1.59	2*n*	OΣ
1869.65	279.9	1.48	6*n*	Δ
1870.18	279.2	1.48	2*n*	OΣ
1870.67	282.2	1.43	7*n*	Δ
1871.57	283.8	1.39	7*n*	Δ
1872.63	285.7	1.47	6*n*	Δ
1873.63	287.6	1.45	9*n*	Δ
1874.64	289.8	1.40	6*n*	Δ



Σ 3062.

1875.67	292°2	1″47	6*n*	Δ
1876.67	294.5	1.46	5*n*	Δ
1877.61	295.8	1.46	4*n*	Δ
1878.60	299.1	1.51	4*n*	Δ
1879.45	301.9	1.50	8*n*	Hl
1880.60	304.5	1.50	6*n*	β
1881.60	307.8	1.60	3*n*	β
1881.83	305.5	1.40	4*n*	Hl
1883.94	312.8	1.44	3*n*	Hl
1885.80	316.1	1.46	5*n*	Hl
1886.92	314.6	1.46	5*n*	Hl
1888.94	319.4	1.36	4*n*	Hl
1889.57	321.1	1.45	3*n*	β
1889.74	321.7	1.48	5*n*	HΣ
1889.86	323.0	1.45	4*n*	Hl
1890.79	325.2	1.34	5*n*	Hl
1892.79	329.1	1.47	3*n*	Com
1893.83	327.8	1.58	2*n*	Com
1895.60	333.5	1.57	6*n*	Com
1896.75	335.6	1.53	4*n*	Hu
1897.17	336.6	1.66	5*n*	Doo
1897.83	334.0	1.50	3*n*	A
1897.84	337.4	1.52	4*n*	Hu
1899.04	339.4	1.54	2*n*	Hu
1899.82	340.7	1.47	5*n*	Doo
1900.06	341.8	1.50	1*n*	Bryant
1900.78	345.2	1.39	2*n*	Do
1901.53	345°2	1″46	2*n*	A
1901.75	345.0	1.46	1*n*	Bryant
1902.01	341.7	1.40	3*n*	Do
1902.94	346.8	1.61	3*n*	Do
1904.13	348.3	1.52	3*n*	Doo
1905.69	352.8	1.51	5*n*	β

The path of the companion in the first quadrant is still somewhat uncertain. With the measures of the next twenty years, the elements of the orbit should be very accurately known. The ellipse shown on the diagram gives a period of 111 years.

[Σ^{1}...Ma (*F. S.* **I**)...Ma (**IX, X, XI, XIII, XV**)...Ma (324, 452)...H (**IV**)...Bp...Da^{3}...Da^{4}...Wr...Se (*Comp. Rend.* **XLVIII**, 375)...Se...Se^{2}...Wn (**V**)...Wn (1738)....Schur (1636)....Flm....Bru^{2} (pp. 76, 85)....Ba (**II, III, IV**)....Newcomb (*Wash. Obsns.* 1867)...Du...Hd...Pl...Perry (*Eng. Mech.* **XXXIX**, 11)...Big...Big (*Bul. Ast.* **XII**, 299)...Kn...WS...WS^{2}...Gl...Sk...Sk^{2}...Sk^{3}....Do (*Trans. R. I. Acad.* **XXIX**, Part 13)(*Observatory* **II**, 172)....Do (2156, 2199, 2242, 2277, 2433, 3023, 3378, 3466, 3680, 3798, 3931)....Je (2450)....OΣ (**IX, X**, p. 189)...Δ (1036, 1118, 1196, 1475, 1573, 1736, 1888, 1979, 2081, 2193)...Δ (**I, II**)...Δ (*Mem. Accad. Sci.*)...Von Fuss (*Mel. Math. et Ast.* **IV**)...(*Beob. Berlin* No. 6, 1892)...*Proc. Haverford Coll. Obsy.* 1891–2...En (2678)....T (2899)....Hl (*Wash. Obsns.* 1881, 1883, 1885)....Hl (**I, II**)....Glasenapp (**II, III**)...β^{3}...β^{4}...β (2957)(*Pub. L. O* **II**)...Sk^{4}...Sk^{5}...Sp (**III**)...Morgan (*A. J.* 439)....Everett (*Mon. Not.* **LVI**, 464)....Collins (*A. J.* 378)....See (3292)(*A. J.* 359, 378)(*Evolution of the Stellar Systems*)...Com (**X**)...Hu (*A. J.* 397, 427)....Larson (*A. J.* 506)....Ho (3558)....Bryant (*Mon. Not.* **LIX**, 400; **LXI**, 486; **LXII**, 283)...Maw (**III**)...Solá (3679)...Gl (*Mon. Not.* **LXI**, 556)...HΣ (**XII**)....Lau (4078)....Doolittle (*A. J.* 416)(*Pub. Flower Obsy.* **I, II**)....A (*A. J.* 429)(*Bul. L. O.* No. 11)...β^{6}...]

APPENDIX TO PART II

RECENT MEASURES AND ADDITIONAL NOTES

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RECENT MEASURES AND ADDITIONAL NOTES

11. **H 3241.** This is identical with H 1935 (No. 12).

21. **Σ 2.**
1904.10 152°7 0″34 3*n* Biesbroeck

48. **H 1003.**
1899.39 32°6 10″39 3*n* Doo 9.0...11.1

53. **Ho 1.**
1901.74 168°6 1″41 3*n* Doo

59. **Hd 3.** The angles disagree.
1906.65 108°8 24″99 2*n* β^6 9.2...13.0

62. **β 1026.** Decided motion in angle of about 1°5 per year.
1905.63 353°9 0″28 2*n* A

67. **β 864.** Slow retrograde motion.
1902.64 130°7 1″84 5*n* Doo

84. **Hd 7.**
1902.71 6°6 7″09 4*n* Doo

92. **Σ 13.**
1903.83 83°4 0″79 1*n* Biesbroeck

104. **OΣ 4.** The motion in angle is now very rapid.
1902.78 85°4 0″17 3*n* Hu (*Bul. L. O.* No. 40)
1905.85 35.0 0.17 3*n* A

110. **Σ 18.** This is wrongly identified as DM (66°) 14 in Part I. It is DM (66°) 19, the place of which is:
R. A. = $0^h\,14^m\,19^s$
Decl. = 66° 59′ 54″
1906.60 91°3 1″11 1*n* β^6

112. **β 776.**
1903.69 202°0 1″03 4*n* Doo

119. **Hd 11.**
1906.62 290°5 36″28 1*n* β^6 8.5...10.7

121. **A. G. 1.**
1906.68 210°8 11″76 2*n* β^6 8.5...8.8

125. **Espin 41.**
1906.58 220°4 5″96 2*n* β^6 8.1...11.4

153. **β 1093.** Angle probably increasing.
1903.71 68°2 0″49 3*n* Doo

167. **Espin 115.**
1906.62 84°2 9″56 2*n* β^6 8.2...10.3

179. **Hd 16.** The recent measures disagree with the former positions.
1906.59 290°5 56″78 2*n* β^6 8.5...11.0

182. **Ho 491.**
1901.75 206°3 0″88 6*n* Doo

194. **Ho 210.** Probably fixed.
1901.91 69°4 1″01 6*n* Doo

196. **H 1964.** Probably unchanged.
1902.78 116°2 6″55 7*n* Doo 8.3...10.4
[*Pub. Flower Obsy.* **II**, pp. 15, 17...]

202. **β 1156.**
1904.03 30°0 0″48 4*n* Doo

217. **β 779.**
1902.19 254°7 1″01 7*n* Doo

229. **H 624.**
1905.40 347°0 15″28 2*n* Espin 8.9...11.2
[*Mon. Not.* **LXVI**, 142...]

242. 12 *Ceti*. **H 322.**

1903.95	190°.3	9″.39	5*n*	Doo

260. λ *Cassiopeiae*. **OΣ 12.**

1902.51	152°.7	0″.58	2*n*	Hu (*Bul. L. O.* No. 40)

262. **OΣ 13.**

1901.09	132°.5	6″.33	4*n*	Doo

266. **Ho 2.**

1902.70	97°.6	2″.05	3*n*	Doo

267. **β 1227.**

AB	1902.40	204°.6	2″.90	6*n*	Doo
AC	1903.79	87.0	22.61	3*n*	Doo
AD	1903.79	116.8	32.88	3*n*	Doo

276. **β 1310.**

AB	1906.65	214°.3	3″.48	1*n*	β^6
AC	1906.65	300.0	15.52	1*n*	β^6
AD	1906.63	145.8	96.34	3*n*	β^6

278. **Ho 211.**

1901.77	19°.0	1″.55	3*n*	Doo

283. **Ho 3.** Doolittle found this single in 1906.

314. 13 *Ceti*. **Ho 212.** This binary will have a short period.

1902.63	286°.0	0″.26	3*n*	A
1903.68	310.5	0.17	4*n*	A
1904.96	12.8	0.12	2*n*	A
1905.60	208.2	0.13	3*n*	A
1905.90	223.7	0.18	3*n*	A
1906.55	238.2	0.23	2*n*	A

[A (*Bul. L. O.* No. 71)...]

317. **OΣ 15.**

1902.56	300°.4	0″.20	2*n*	Hu (*Bul. L. O.* No. 40)

330. **β 1097.**

1900.90	250°.1	0″.49	4*n*	Doo
1905.59	250.7	0.40	2*n*	A

335. **β 395.** From the measures to 1904 Aitken (*Bul. L. O.* No. 71) finds a period of 24.0 years, and gives the following ephemeris:

1905.7	5°.3	0″.16
1906.7	58.3	0.20
1907.7	82.1	0.32
1908.7	92.6	0.44
1909.7	98.6	0.56
1910.7	102.6	0.65

The following are the latest measures:

1903.67	306°.7	0″.42		A
1904.96	332.8	0.20		A
1905.78	354.3	0.20	2*n*	A

339. **Ho 305.**

1902.74	193°.0	5″.87	6*n*	Doo

346. **Σ 45.** The proper motion of the principal star, Groombridge 111, is given:

Greenwich 0″.045 in 268°.7

This agrees with the change in the companion.

372. **Σ 48.** The Greenwich proper motion of the larger star, Groombridge 122, is:

0″.027 in 126°.3

374. **OΣ 18.**

1902.83	136°.5	1″.29	2*n*	Hu (*Bul. L. O.* No. 40)
1906.00	141.7	1.18	2*n*	A

375. **Σ 50** *rej.*

1906.62	85°.5	18″.14	2*n*	β^6	8.0...10.2

384. **Σ 53** *rej.*

1906.73	340°.5	28″.51	1*n*	β^6

401. **β 492.** The Greenwich proper motion is 0″.020 in 232°.5.

403. **Arg. 2.** The proper motion of Groombridge 135 is given:

Greenwich 0″.122 in 124°.4

405. **β 493.**

1900.81	52°.0	0″.72	2*n*	Doo

406. **Σ 58** *rej.*

1906.59	172°.0	44″.29	2*n*	β^6	9.1...9.5

413. **Muller 1.** No motion.

1902.96	191°.2	2″.31	5*n*	Doo	6.4...10.5

416. **Ho 492.**

1901.75	112°.0	2″.87	5*n*	Doo

424. **OΣ (App) 8.**

1906.61	125°.0	44″.43	3*n*	β^6

425. **Ho 306.** Change in angle?
1902.44 169°5 1″26 3*n* Doo

426. *η Cassiopeiae.* **Σ 60.**
1905.60 231°8 5″74 2*n* A

446. **Ho 4.** No change.
1902.73 202°4 1″68 5*n* Doo

457. **Σ 66** *rej.* The place of this in Struve agrees with that of the 9m star, DM (35°) 158, but that has no companion, and nothing was found in the vicinity which seemed likely to be Σ 66 *rej.* (1906).

458. **β 497.**
BC 1900.79 153°7 0″94 3*n* Doo
AB 1900.82 171.9 125.66 2*n* Doo

467. **Σ 70.** The Greenwich proper motion of the principal star is:
0″081 in 105°7

473. **Espin 118.**
1904.17 59°8 2″54 2*n* Biesbroeck 9.2...9.4

479. **66** *Piscium.* **OΣ 20.**
1902.71 323°4 0″43 3*n* Hu (*Bul. L. O.* No. 40)
1903.95 321.2 0.50 3*n* Biesbroeck

489. **β 1099.**
1905.75 328°6 0″23 2*n* A

490. **Howe 1.** The angle seems to be increasing.
1903.73 117°7 1″76 3*n* Doo

495. **Arg. 3.** The proper motion of the principal star, Groombridge 187, is:
Greenwich 0″047 in 103°4

498. **Ho 307.** Change in distance?
1903.65 81°5 2″67 3*n* Doo

508. **β 302.** Slow motion in angle.
1900.82 195°5 0″61 3*n* Doo

539. **Ho 493.**
1902.34 20°2 35″14 3*n* Doo

540. **Hn 62.** Unchanged.
1903.71 291°4 1″09 3*n* Doo 9.2...9.6

541. **OΣ 21.** Nothing later of this but the following:
1905.68 6°6 0″15 2*n* A
The proper motion of this star, Groombridge 220, is:
Greenwich 0″068 in 104°5

547. **See 10.**
1902.96 323°0 4″61 6*n* Doo

548. **Ho 494.** The later measures give a larger distance.
1905.97 96°3 12″78 3*n* Doo 8.0...13.2

550. **Ho 495.**
1903.04 249°6 12″08 5*n* Doo

561. **72** *Piscium.* **H 1068.**
1903.77 261°7 56″02 6*n* Doo ...12.5

571. **Ho 5.** Doolittle found this certainly single in 1906.

585. **Ho 308.** Change is probable.
1904.02 256°0 19″09 3*n* Doo

600. *φ Andromedae.* **OΣ 515.**
1902.78 232°7 0″25 2*n* Hu (*Bul. L. O.* No. 40)
1904.02 226.5 0.29 2*n* Biesbroeck

606. **Ho 214.**
1903.67 247°6 2″87 3*n* Doo

619. **β 1162.**
1900.90 148°8 0″40 2*n* Doo

620. **Σ 94.** The principal star has recently been found to be a close pair by Hussey.
AB 1904.78 218°8 0″81 1*n* Hu 9.0...12.5

624. **45** *Andromedae.* **Ho 215.** Doolittle found this single under favorable conditions in 1906.

630. **β 398.**
1901.05 50°2 1″95 4*n* Doo

633. **β 236.**
1902.37 114°3 5″57 6*n* Doo

638. **H 2026.** Probably moving together.
1906.63 304°8 10″28 2*n* β^6
A and DM (4°) 205
1880.3 57°1 224″81 *A. G. Albany*
1906.65 58.1 230.85 1*n* β^6

646. **β 1100.** The two measures in 1900 are included in the following:
1903.64 29°9 0″54 7*n* Doo

649. **H 2028** The Greenwich proper motions of these two stars, Groombridge 267 and 266, are:
A 0″037 in 104°0
B 0.032 in 121.8

657. **Ho 6.** No motion.
1902.73 114°2 1″54 4*n* Doo

662. **β 3.** No motion.
1901.75 28°5 4″66 4*n* Doo

673. **H 1077.** The proper motion of this star, Groombridge 282, is:
Greenwich 0″030 in 207°5

696. **See 11.**
1901.84 315°6 1″95 3*n* Doo 8.3...9.0

700. **β 782.**
1902.38 78°8 2″90 6*n* Doo

702. **Hu 523.** The proper motion of Groombridge 293 is:
Greenwich 0″040 in 112°2

713. *Polaris.* **Σ 93.**
1903.92 215°6 18″22 3*n* Biesbroeck

728. **Lv 1.**
1906.68 171°5 0″58 1*n* β^6

733. **Ho 309.**
AB 1903.72 24°5 2″79 3*n* Doo
AC 1903.72 97.0 44.56 3*n* Doo

743. **β 1163.**
1903.97 196°9 0″56 2*n* Biesbroeck

746. **Ho 310.** Unchanged.
1904.54 355°5 1″19 5*n* Doo

752. **H 2045.** The proper motion of Groombridge 307 is:
Greenwich 0″235 in 123°0
The companion probably has the same motion.
1906.66 81°2 21″38 2*n* β^6 8.1...11.2

757. **Ho 7.**
1904.67 161°7 14″33 5*n* Doo

764. **Ho 8.**
1904.62 247°5 3″14 5*n* Doo 9.6...10.5

765. **β 1164.**
1903.00 163°5 0″41 4*n* Doo

773. **Ho 9.** Fixed.
1904.61 92°2 2″57 5*n* Doo

775. **H 1081.**
1904.86 317°3 9″35 2*n* Es 9.0...9.3
[Espin (*Mon. Not.* **LXVI**, 142)...]

780. **Espin 4.** The proper motion of Groombridge 328 is:
Greenwich 0″050 in 117°6

785. **β 1230.**
1900.84 220°7 3″13 2*n* Doo

800. **Arg. 4.**
1906.73 72°6 17″70 1*n* β^6 8.2...8.6

805. **Σ 134** *rej.* This has been identified as DM (47°) 449. The place is:
R. A. = $1^h\ 26^m\ 55^s$ }
Decl. = 47° 23′ }
1906.56 350°3 10″80 2*n* β^6 9.2...10.8

810. **Howe 4.**
1904.23 319°8 0″84 4*n* Doo 8.7...9.0

817. **H 2053.** The proper motion of the principal star, Groombridge 335, is:
Greenwich 0″014 in 289°1

The only measure is this:
1906.54 27°7 31″49 2*n* β^6 8.0...10.7

831. **H 2061.**
1906.69 321°1 68″52 3*n* β^6
The four sets of measures give for the proper motion of A:
0″348 in 132°3

833. **H 1085.** Unchanged.
1906.55 118°0 3″68 2*n* β^6 8.7...8.7

847. **H 1087.**
1904.83 73°5 11″37 3*n* Es 9.0...10.0
[Espin (*Mon. Not.* **LXVI**, 142)...]

850. **H 2064.**
1906.55 320°5 20″84 2*n* β^6 8.2...10.8

923. **β 736.**
AB 1900.81 210°8 0″98 2*n* Doo
AC 1900.81 115.7 12.24 2*n* Doo

927. **Ho 496.**
1902.72 174°7 14″60 4*n* Doo

977. **Ho 311.**
1904.29 179°7 0″42 4*n* Doo

979. **H 3470.** The only measure is:
1906.71 299°6 10″41 2*n* β^6 9.7...9.8

1009. **H 1097.**
1905.20 39°2 14″45 3*n* Es 9.5...11.0
[Espin (*Mon. Not.* **LXVI**, 142)...]

1027. **Σ 185.** This is Groombridge 410. The proper motion given in Part II is that of Groombridge 409, a smaller star in the field about 2′ *s*. The proper motion of 410 is:
Greenwich 0″035 in 124°9

1033. **Ho 10.** No motion.
1904.60 197°7 2″76 5*n* Doo 8.2...11.5

1036. 48 *Cassiopeiae*. **β 513.** The angular motion is now very rapid. The companion has passed over 190° since 1878.
1904.40 67°3 0″41 1*n* Biesbroeck
1906.32 97.4 0.37 2*n* A

1038. **Ho 11.**
1901.88 140°3 4″87 6*n* Doo

1040. **Σ 191.** The proper motion of Groombridge 422 is:
Greenwich 0″028 in 297°5

1059. **Ho 12.** Unchanged.
1901.76 98°3 3″35 4*n* Doo

1066. **β 873.** The proper motion is:
Greenwich 0″024 in 143°8

1070. γ *Andromedae*. **OΣ 38.**
1902.52 117°2 0″36 3*n* Hu (*Bul. L. O.* No. 40)
1905.98 111.0 0.40 2*n* A

1089. **Σ 210** *rej.*
1905.91 242°8 16″82 2*n* Es 8.6...9.5
[Espin (*Mon. Not.* **LXVI**, 142)...]

1098. 11 *Arietis*. **Ho 312.** Without change.
1904.06 330°2 1″63 4*n* Doo

1133. **Espin 47.**
AB 1906.70 289°4 5″93 2*n* β^6 8.5...10.7
AC 1906.70 257.7 20.21 2*n* β^6 ...10.0

1140. **Ho 497.** Probably unchanged.
1901.74 69°6 0″48 5*n* Doo

1144. **Σ 228.**
1906.27 91°7 0″56 2*n* A

1159. **Σ 232.** This is H II. 35.

1163. **OΣ (App) 25.** The proper motion is:
Greenwich 0″030 in 126°9

1176. **H 1113.** This appears to be DM (65°) 246.
1906.69 177°1 8″75 2*n* β^6 9.6...12.5

1179. **Lalande 4219.**
1905.99 353°6 2″03 1*n* A

1197. **H 2123.** There is a small star nearer A:

A*a*	1906.72	358°8	10″75	1*n*	β^6	8.3...13.5
AB	1906.70	32.8	30.15	2*n*	β^6	...10.9

1217. 9 *Persei.* **β 875.**

1906.70	161°4	11″67	3*n*	β^6

1243. **Espin 7.** The only later position is:

1906.72	258°8	11″17	3*n*	β^6	7.3...12.8

In measuring this, a new pair was found a short distance *np*, which is not given in Part I.

1906.70	121°9	8″28	1*n*	β^6	6.4...14.5

This is DM (54°) 535, the place of which is:

R. A. = $2^h\ 15^m\ 31^s$
Decl. = 54° 49′

1246. **Espin 49.**

AB	1906.70	150°3	38″75	2*n*	β^6	8.6...
BC	1906.70	98.0	1.93	2*n*	β^6	11 ...11

1247. **Ho 313.**

AB	1903.72	76°8	1″84	3*n*	Doo
AC	1903.73	87.3	17.00	2*n*	Doo

1252. **β 738.**

1900.82	173°7	0″73	2*n*	Doo

1253. **Ho 314.**

1903.70	200°2	3″90	3*n*	Doo

1264. **Ho 216.**

1903.52	335°5	1″17	5*n*	Doo	7.8...9.6

1296. **H 3502.** The only measure is:

1906.73	85°8	28″67	1*n*	β^6	7.2...11.0

1299. **OΣ 42.** Aitken notes, "quadrant indeterminate."

1906.59	308°2	0″08	1*n*	A

1318. **H 1120.**

AB	1905.94	90°9	17″32	2*n*	Es	7.0...11.5
	1906.69	90.9	17.79	2*n*	β^6	7.0...11.2
AC	1906.69	320.8	39.58	2*n*	β^6	11.3

[Espin (*Mon. Not.* LXVI, 142)...]

1321. **Σ 278.**

1906.69	60°9	0″51	2*n*	β^6

1327. **H 2146.** Not red.

1906.66	82°4	32″24	1*n*	β^6	9.0...9.0

1340. **β 305.**

1903.67	205°8	20″91	3*n*	Doo

1357. **Ho 315.**

1903.75	357°1	1″20	3*n*	Doo

1365. **OΣ 43.**

1902.61	42°5	1″15	3*n*	Hu (*Bul. L. O.* No. 40)

1374. **Σ 291.**

AB	1906.65	297°9	3″52	1*n*	β^6
AC	1906.65	243.6	67.48	1*n*	β^6

1376. **Espin 8.** This star, Groombridge 540, has some proper motion:

Greenwich 0″079 in 113°9

1384. **β 521.**

1903.93	152°6	5″60	5*n*	Doo	6.5...12.4

1427. **Σ 305.**

1906.66	316°8	3″11	3*n*	β^6

1439. **β 523.**

1903.72	205°1	1″48	3*n*	Doo

1442. **Ho 217.**

1903.72	275°6	2″39	3*n*	Doo

1444. **Lv 2.**

1903.84	24°0	2″82	3*n*	Doo	8.7...11.8
1906.73	26.6	2.16	1*n*	β^6	8.5...13.0

1458. **H 3533.** No motion.

1906.73	273°2	39″53	1*n*	β^6	7.2...8.0

1471. 20 *Persei.* **β 524.**

1905.98	358°9	0″20	1*n*	A
1906.58	355.8	0.23	3*n*	A

1478. **A. G. 57.**

1906.69	349°0	10″65	2*n*	β^6

1483. **H 658.**
1906.69 24°5 18″30 2*n* β^6 8.9...9.2

1485. **Ho 316.**
1904.23 283°1 19″71 4*n* Doo

1487. **Σ 325.**
1906.65 188°2 9″99 2*n* β^6

1494. **Ho 317.** No change.
1904.62 308°4 2″86 5*n* Doo

1501. **β 1173.**
1906.59 332°3 0″15 3*n* A

1506. **Ho 219.**
1904.59 246°6 6″57 5*n* Doo

1508. **β 525.** The angular motion is increasing.
1906.59 144°6 0″25 3*n* A

1510. **Σ 331.** The proper motion is given:
Greenwich 0″056 in 137°2

1515. **Ho 318.** No motion.
1904.62 22°7 2″28 5*n* Doo

1516. **Ho 13.** No motion.
1904.71 161°7 2″01 5*n* Doo

1533. **Hu 811.** With another measure (*Bul. L. O.* No. 74) the mean is:
1903.37 220°6 2″04 2*n* Hu 7.5... 10.0

1540. **H 3546.**
1906.70 81°6 8″62 2*n* β^6 9.6...11.2

1566. **Ho 499.** Angle increasing?
1901.90 238°3 1″39 3*n* Doo
1906.02 241.6 1.51 3*n* Doo

1567. **β 527.**
1904.76 71°8 0″77 1*n* Hu

1576. **Σ 345.** This star, Groombridge 605, has a small proper motion:
Greenwich 0″049 in 126°0

1579. **H 2173.** Groombridge 612 has some proper motion:
Greenwich 0″040 in 170°0

1591. **Ho 500.** Apparently fixed.
1901.83 35°9 0″50 5*n* Doo

1597. **Ho 501.** The measures are discordant in distance.
1903.84 204°2 8″02 3*n* Doo
1906.66 203.3 9.35 3*n* β^6

1607. **Espin 11.** The principal star, Groombridge 627, is given a proper motion of 0″042 in 282°3.
1906.72 63°4 10″51 1*n* β^6 6...13

1609. **H 3554.** No change.
1906.69 348°4 19″93 2*n* β^6 8.0...10.3

1619. **Ho 502.** Without change.
1901.82 16°3 0″54 5*n* Doo

1623. **Σ 367.**
Σ 367 and DM (0°) 553
1906.65 Δ Decl. = 101″43 2*n* β^6

A comparison with the A. G. positions indicates a proper motion in declination of 0″14 of one of the stars.

1627. **Ho 503.**
1905.26 96°6 31″04 5*n* Doo 5.9...12.5
1906.63 96.4 30.88 3*n* β^6

1628. **H 1133.** The proper motion of Groombridge 628 is given 0″037 in 132°2 (Greenwich).

1650. 95 *Ceti.* **A. C. 2.** This strange system deserves special attention with large instruments.
1906.03 166°4 0″43 2*n* A

1662. **Ho 319.**
1904.71 47°2 12″54 5*n* Doo 7.9...11.5

1669. **Espin 52.**
1906.72 285°9 6″17 2*n* β^6 8.8...12.5

1676. **Ho 320.** Without change.
1904.61 168°0 1″29 5*n* Doo

1690. Ho 321. No motion.
1904.64 35°1 1″61 5*n* Doo

1695. Ho 322.
1904.64 122°7 1″75 5*n* Doo

1729. OΣ 56. The Greenwich proper motion is 0″045 in 143°8.

1734. Espin 121.
1906.72 326°3 8″16 2*n* β^6 8.4...12.7

1747. Σ 400.
1905.63 341°3 0″44 2*n* A

1754. Ho 14.
1903.72 22°7 1″98 3*n* Doo

1783. S 430. The Greenwich proper motions of these two stars, Groombridge 714 and 715, are given:
A = 0″070 in 122°8
B = 0.083 in 124.4

1808. Ho 323. Unchanged.
1904.57 213°6 16″03 5*n* Doo 7.6...12.4

1811. Hu 813. With another measure (*Bul. L. O.* No. 74) the mean is:
1903.34 291°0 3″48 2*n* Hu 7.0...14.5

1822. H 2201.
1906.68 36°6 41″10 1*n* β^6 8...9

1834. *o Persei.* **β 535.**
1904.56 49°0 1″00 6*n* Doo

1835. Ho 504. No evidence of change.
1901.83 187°5 0″90 5*n* Doo

1836. β 880. The measures by Aitken (3638) in 1899 were omitted:
AB 1899.53 361°9 0″73 2*n* A
AC 1899.53 38.8 23.54 2*n* A

1841. β 1183. Groombridge 731 is given a small proper motion:
Greenwich 0″027 in 116°3

1842. Σ 441 *rej.*
AB 1906.67 244°3 19″15 2*n* β^6 8.4...10.0
AC 1906.67 116.1 20.98 2*n* β^6 ...12.2

1854. Σ 443. The distant star was measured by Ball.
1879.40 159°3 64″23 2*n* Bl
1906.65 167.9 27.51 4*n* β^6

The measures of Bl, Doo and β give for the proper motion of A:
1″328 in 155°2

The minimum distance of 6″2 will be about 1928. This star has a small companion, 13.5 m, not previously seen:
Cc 1906.64 140°5 4″15 2*n* β^6

1865. S 436. No relative motion.
1906.67 75°3 58″38 3*n* β^6

1890. Ho 324.
1904.75 337°8 0″58 5*n* Doo

1900. OΣ 65.
1902.61 202°7 0″64 2*n* Hu (*Bul. L. O.* No. 40)

1904. Hu 814. With another measure (*Bul. L. O* No. 74) the mean is:
1903.68 89°8 0″97 2*n* Hu 8.3...13.0

1917. Σ 461. Probably fixed.
1906.72 108°1 1″17 1*n* β^6

1936. Ho 325. If the early measure is correct, the distance has increased.
1905.23 12°0 23″56 5*n* Doo
1906.58 11.7 23.23 3*n* β^6

1940. β 540.
1901.05 327°2 1″19 3*n* Doo

1946. Hu 815. With other measures (*Bul. L. O.* No. 74) the mean is:
1903.88 205°1 2″68 3*n* Hu 8.0...11.3

1952. Σ 460. The proper motion is small:
Greenwich 0″019 in 264°0

1954. Ho 220. Probably fixed.
1905.26 111°2 1″76 5*n* Doo

1956. **Ho 505.** No change.

1901.91 193°.2 1″.23 5*n* Doo

1959. **H 2211.**

1906.73 261°.6 11″.33 2*n* β^6 8.5...10.8

1970. **Hn 70.** No change.

1901.09 270°.8 3″.41 3*n* Doo 9.0...10.2

1972. **Hn 71.** No change.

1901.09 158°.4 3″.95 3*n* Doo 8.8...11.9

1990. **Σ 481.** Either A or C has a small proper motion in declination.

AC 1906.63 326°.6 16″.79 4*n* β^6

A and DM (27°) 623

1906.62 Δ Decl. = 11″.18 3*n* β^6

A comparison of this with Lalande, Weisse and A. G. indicates a proper motion in declination of about 0″.05.

1996. **Ho 221.** Without change.

1904.69 95°.8 4″.77 5*n* Doo

2000. **Espin 122.**

1906.73 249°.5 5″.80 1*n* β^6 8.5...10.8

2007. **Σ 483.** This appeared to be single under favorable conditions with the 40-inch (1906.68).

2021. **Hn 72.** No motion.

1901.09 35°.6 1″.92 3*n* Doo

2038. **Ho 506.** Fixed.

1904.84 72°.6 2″.20 3*n* Doo

2050. **Ho 326.**

1904.89 176°.3 0″.33 3*n* Doo

2052. **Ho 327.**

1903.72 319°.1 16″.54 3*n* Doo

2063. **Σ 496** *rej.* Not in DM, but near Groombridge 786.

AB 1906.67 48°.0 31″.71 2*n* β^6 8.8... 8.7
BC 1906.67 328.0 21.33 2*n* β^6 ...10.0

A and Groom. 786

1906.67 138°.2 263″.3 1*n* β^6

2064. **Σ 502** *rej.* The only measures are:

AB 1906.67 286°.1 17″.32 2*n* β^6 8.4...
BC 1906.67 302.5 10.94 2*n* β^6 9.4...9.4

2068. **OΣ 74.**

1902.77 292°.9 0″.40 3*n* Hu (*Bul. L. O.* No. 40)

2069. **Upton 1.** This is SD (18°) 769. It is doubtful whether the apparent change in distance is real.

1906.71 98°.2 5″.96 3*n* β^6 8.0...10.1

2072. **H 2224.**

1906.68 311°.5 51″.38 2*n* β^6 7.0...9.1

2085. **H 3626.**

1906.68 38°.0 20″.44 2*n* β^6 8.9...10.1

2088. **Σ 511.**

1905.86 250°.4 0″.41 1*n* A

2093. **OΣ 77.**

1902.77 188°.0 0″.26 3*n* Hu (*Bul. L. O.* No. 40)
1905.92 205.4 0.29 1*n* A

2099. **See 34.** Evidently an error in the first position-angle.

1906.72 55°.8 19″.10 2*n* β^6 8.0...12.8

2104. **Hu 816.** With other measures (*Bul. L. O.* No. 74) the mean is:

1904.12 154°.2 0″.31 3*n* Hu 9.2...9.8

2110. **Ho 328.**

1906.12 166°.4 0″.21 2*n* A

2112. **Ho 507.** No motion.

1901.89 31°.0 5″.22 6*n* Doo

2113. **Hu 817.** With other measures (*Bul. L. O.* No. 74) the mean is:

1904.02 250°.2 3″.33 3*n* Hu 9.0...12.0

2134. **OΣ 79.**

1902.77 264°.4 0″.30 3*n* Hu (*Bul. L. O.* No. 40)
1905.69 282.0 0.28 1*n* A

2140. **β 310.**
1904.08 170°.4 19″.63 3*n* Doo

2144. **Σ 532** *rej.* The only measure is:
1906.72 204°.0 19″.37 2*n* β^6 8.7...10.0

2145. **Ho 508.** No change.
1904.67 221°.9 4″.06 5*n* Doo 8.1...12.0

2150. **Ho 329.** The companion has the same proper motion.
1904.38 63°.4 35″.18 5*n* Doo

2154. **OΣ 82.**
1902.77 117°.4 0″.67 3*n* Hu (*Bul. L. O.* No. 40)

2164. **Ho 15.**
1903.04 150°.4 0″.71 4*n* Doo

2170. **Ho 330.** Unchanged.
1903.78 21°.1 1″.20 3*n* Doo

2175. **Ho 331.**
1903.85 349°.3 16″.05 3*n* Doo

2187. **β 1185.** In the following measures the quadrant is noted as certain. The period will probably be short.
1906.03 203°.6 0″.22 2*n* A

2207. **β 1186.**
1904.92 175°.1 0″.79 3*n* Doo

2213. **β 311.**
1904.12 338°.3 1″.00 3*n* Doo 6.2...6.6

2230. 80 *Tauri.* **Σ 554.** It is quite certain that my measure in 1897 really belongs to Hu 1080 (No. 12992) which is in the immediate vicinity. Aitken has been able to measure 80 *Tauri* recently, and this is the first time it has been seen double since 1878. It is probable that the distance will now slowly increase:
1906.02 40°.1 0″.54 3*n* A

2268. 46 *Eridani.* **β 881**
1904.11 44°.0 1″.82 3*n* Doo

2274. **Σ 565.** The principal star, Groombridge 851, has some proper motion:
Greenwich 0″.082 in 117°.6

2278. **Σ 568** *rej.*
1906.63 214°.3 21″.99 3*n* β^6 8.2...10.7

2281. **Σ 555** *rej.* This is DM (81°) 162. The only measure is:
1906.71 148°.6 24″.64 3*n* β^6 9.1...9.8

2282. **Σ 561** *rej.*
1906.66 149°.0 24″.98 2*n* β^6 8.5...10.5

2319. **Ho 332.** Probably unchanged.
1903.13 303°.6 0″.98 4*n* Doo

2320. **Ho 333.** Probably fixed.
AB 1903.42 163°.0 1″.83 6*n* Doo
AC 1903.42 219.7 34.47 6*n* Doo

2367. **OΣ (App) 55.** No change.
1906.68 15°.9 37″.42 2*n* β^6

2373. **Σ 600** *rej.* This is the only measure:
1906.72 51°.5 30″.12 3*n* β^6 8.6...10.8

2376. **Σ 558.** Fixed.
1905.42 203°.7 3″.12 2*n* A

2377. **Hu 818.** With another measure (*Bul. L. O.* No. 74) the mean is:
1903.75 72°.6 0″.38 2*n* Hu 8.7...9.0

2381. **β 883.** The motion is now rapid in angle:
1905.75 150°.3 0″.13 2*n* A
1906.06 173.9 0.16 3*n* A

2382. **Hu 819.** With a later measure (*Bul. L. O.* No. 74) the mean is:
1903.75 295°.6 0″.25 2*n* Hu 8.4...8.8

2383. **β 552.**
1905.90 227°.9 0″.46 2*n* A

2402. **Σ 611** *rej.*
1906.65 206°.8 14″.32 2*n* β^6

2422. **Ho 16** (=**Hu 1092**). See No. 13021.
1905.49 14°3 0″67 4*n* Doo 8.1...11.1

2441. **Ho 17.** No change.
AB 1904.01 53°9 4″28 3*n* Doo
AC 1904.01 162.2 11.31 3*n* Doo

2444. **Ho 222.** No change.
1903.78 222°1 2″19 4*n* Doo

2463. **β 315.**
1901.14 225°4 10″44 3*n* Doo

2477. **Hu 820.** With another measure (*Bul. L. O.* No. 74) the mean is:
1903.70 205°6 1″79 2*n* Hu 8.8...10.0

2491. **Ho 224.** No motion.
1904.05 280°6 1″92 4*n* Doo

2496. **β 884.**
1900.87 39°5 0″4± 1*n* Doo

2497. **β 749.** Change in angle.
1901.14 235°7 1″04 4*n* Doo

2500. **Ho 223.**
1902.32 38°8 1″69 3*n* Doo

2521. γ *Caeli.* **β 750.**
1900.87 317°5 2″80 2*n* Doo

2535. 14 *Orionis.* **OΣ 98.**
1905.98 164°0 0″90 2*n* A

2551. **Σ 648.**
AB 1906.73 68°9 4″69 1*n* β^6
AC 1906.73 115.7 36.65 1*n* β^6 ...12.3
AD 1906.73 62.8 36.73 1*n* β^6 ...12.7

2562. **Hu 821.** With two other measures (*Bul. L. O.* No. 74) the mean is:
1904.13 190°1 0″93 3*n* Hu 8.0...10.0

2565. **β 885.**
1900.92 198°4 0″65 2*n* Doo

2572. **Hu 822.** With another measure (*Bul. L. O.* No. 74) the mean is:
1903.82 183°5 4″62 2*n* Hu 8.5...12.5

2577. **H 1154.** This is DM (71°) 300.
1906.72 92°2 18″76 2*n* β^6 7.9...12.2

2605. **β** *Orionis.* **β 555.** Aitken, with a power of 1000 on the 36-inch, found no elongation in 1905.99.

2614. **Hu 823.** With another measure (*Bul. L O.* No. 74) the mean is:
1903.82 9°4 4″32 2*n* Hu 8.8...12.0

2624. **Ho 334.** Probably no change.
1903.94 184°9 1″95 6*n* Doo

2635. **Ho 18.**
1904.46 162°9 4″62 4*n* Doo

2676. **OΣ 105** (=**Ho 225**).
1904.90 104°3 0″45 4*n* Doo

2702. **Hn 73.** No motion.
1901.09 49°3 2″80 3*n* Doo

2714. **Σ 705.** No motion.
1906.67 11°9 18″41 3*n* β^6

2721. **Ho 226.**
1904.33 54°8 0″78 4*n* Doo

2772. **Σ 717** *rej.* The only measure is the following:
1906.73 289°4 17″18 1*n* β^6 8.2...9.6

2780. 32 *Orionis.* **Σ 728.** The change is now rapid in angle.
1905.98 132°7 0″21 2*n* A

2788. **Σ 732** *rej.* The measure given in Part II belongs to No. 2802.
1906.73 134°8 27″22 1*n* β^6 8.0...10.0

2791. **Ho 335.** No change.
1903.86 117°3 2″89 6*n* Doo

2850. **Da 3.** Probably fixed.
1903.80 177°.3 0″.85 3*n* Doo

2857. **26** *Aurigae.* **β 1240.**
1905.69 319°.8 0″.19 1*n* A

2868. **Hu 824.** With other measures (*Bul. L. O.* No. 74) the mean is:
1904.04 158°.6 2″.86 3*n* Hu 7.5...12.3

2874. **Hu 825.** With other measures (*Bul. L. O.* No. 74) the mean is:
1904.04 344°.0 0″.31 3*n* Hu 7.8...8.0

2896. **126** *Tauri.* **β 1007.**
1905.99 253°.5 0″.17 1*n* A

2908. **Ho 509.** Without change.
1901.04 204°.9 11″.29 3*n* Doo

2930. **Ho 510.** Without change.
1901.30 243°.7 1″.33 3*n* Doo

2952. **Ho 336.** Fixed.
1903.04 238°.3 19″.36 3*n* Doo

2955. **Ho 19.**
1904.80 346°.7 6″.88 5*n* Doo

2970. **β 92.** No motion.
1903.91 169°.6 9″.06 3*n* Doo

3005. **Σ 793** *rej.* Nothing late but the following:
1906.73 243°.4 12″.98 1*n* β^6 9.0...11.0

3038. **Ho 20.** No motion.
AB 1903.06 277°.4 7″.92 3*n* Doo
AC 1902.57 288.7 50.05 2*n* Doo

3045. **Ho 337.**
AB 1904.02 113°.7 8″.99 3*n* Doo
BC 1904.02 98.3 0.96 3*n* Doo

3048. *a Orionis.*
AD 1902.09 347°.1 76″.71 3*n* Doo
AE 1902.58 152.8 175.41 4*n* Doo

Doolittle (*Pub. Flower Obsy.* II) measures a pair of small stars "near *α Orionis*":
1903.44 173°.2 8″.09 6*n* Doo 11.0..11.8

3055. **Ho 227.**
1903.87 236°.3 2″.41 3*n* Doo

3087. **Hu 826.** (AC = **Ho 511.**) With other measures of the close pair (*Bul. L. O.* No. 74) the mean is:
1904.04 298°.8 0″.63 3*n* Hu 9.0...11.2

The only recent measure of C is:
1903.14 171°.0 4″.11 5*n* Doo

3089. **Ho 21.** Change from proper motion:
1902.97 241°.4 9″.06 5*n* Doo

3100. **β 564.**
1905.01 70°.7 1″.40 4*n* Doo

3124. **Hu 827.** With another measure (*Bul. L. O.* No. 74) the mean is:
1903.72 108°.5 0″.23 2*n* Hu 8.8...9.0

3141. **Ho 228.** Change in distance?
1903.21 266°.7 2″.26 7*n* Doo

3143. **Glasenapp 2.** This appears to be DM (18°) 1092.
1906.72 37°.1 5″.11 1*n* β^6 9.3...9.8

3168. **H 380.** This is DM (34°) 1274.
1906.69 202°.0 19″.25 1*n* β^6 9.0...9.0

3169. **Σ 844.** No change.
1906.69 7°.2 23″.22 1*n* β^6

3211. **Σ 857** *rej.*
1906.00 218°.9 30″.66 3*n* β^6 7.3...10.2

3226. **Σ 874** *rej.* The principal star is SD (3°) 1340.
1906.72 353°.9 21″.15 1*n* β^6 8.7...9.5

3230. **Ho 22.** No change.
1904.27 197°.5 0″.69 5*n* Doo

3232. **H 2300.**
1906.10 95°.0 16″.02 2*n* β^6 9.0...11.5

3235. **Ho 23.** No change.
1903.02 246°.4 2″.81 4*n* Doo

3249. **H 723.**
1906.14 214°.1 14″.67 1*n* β^6 9.6...9.8

3251. **β 323.**
1903.77 95°.8 2″.21 3*n* Doo

3258. **β 894.**
1904.36 136°.9 5″.20 4*n* Doo

3275. **β 18.**
1903.80 274°.1 1″.69 3*n* Doo

3279. **Ho 24.** No change.
1904.00 153°.1 4″.20 3*n* Doo

3290. **Ho 230.**
1903.80 56°.1 1″.78 3*n* Doo

3291. **β 895.**
1906.18 171°.5 0″.22 1*n* A

3302. **Ho 338.**
1903.81 291°.0 2″.26 3*n* Doo

3306. **Σ 890** *rej.*
1906.08 267°.6 17″.28 2*n* β^6 8.7...11.0

3309. **Ho 231.**
1903.85 47°.3 6″.91 3*n* Doo

3310. **Σ 887** *rej.* Not in DM. A 7 m star, 202°:155″.
1905.95 172°.1 9″.65 2*n* β^6 9.3...9.8

3314. **β 1296.**
1905.14 208°.0 0″.23 1*n* A

3318. **H 386.**
1906.04 63°.2 20″.31 2*n* β^6 9.4...9.5

3324. **Ho 232.** No motion.
1903.85 346°.8 2″.21 3*n* Doo

3331. **β 1020.**
1902.53 161°.4 1″.21 6*n* Doo

3337. **Ho 233.** No motion.
1903.85 36°.1 1″.69 3*n* Doo

3338. **5** *Lyncis.* **S 514.**
AB 1906.00 139°.6 30″.96 3*n* β^6
AC 1906.00 272.1 95.52 3*n* β^6

3339. **Σ 896.** No material change.
1906.01 81°.3 19″.17 3*n* β^6

3340. **H 726.**
AB 1905.99 152°.7 22″.50 2*n* β^6 9.5...11.0
AC 1905.99 87.3 22.88 2*n* β^6 ...11.1

3346. **S 517.** Identified as SD (16°) 1454 (8.5), the place of which is:

$$\left.\begin{array}{l}\text{R. A.} = 6^h\ 16^m\ 47^s \\ \text{Decl.} = -16^\circ\ 32'.7\end{array}\right\}$$

The 40-inch shows a faint attendant to the smaller component.
AB 1906.14 192°.2 22″.72 1*n* β^6 9.0... 9.0
BC 1906.14 246.6 1.97 1*n* β^6 ...13.5

3370. **Ho 339.** No change.
1904.06 196°.0 4″.84 3*n* Doo

3385. **Σ 909.**
1906.11 87°.8 13″.53 2*n* β^6

3403. **Arg. 14.**
1906.11 227°.7 6″.98 2*n* β^6 9.0...9.3

3404. **H 391.**
1906.05 233°.1 17″.79 2*n* β^6 9.0...10.6

3406. **Ho 514.**
1903.29 126°.5 19″.27 5*n* Doo

3409. **Ho 340.**
1904.77 23°.2 6″.23 5*n* Doo

3416. **β 896.**
AB 1904.06 190°.8 1″.04 4*n* Doo

3423. Σ 918. The proper motion of this star, Groombridge 1173, has a different value in the Greenwich catalogue:

0″089 in 184°1

3425. H 3863. Probably fixed.

1901.11 119°2 2″67 3*n* Doo 7.0...8.8

3436. H 3866. No motion.

1901.11 136°7 4″01 3*n* Doo

3441. H 392.

1906.05 36°8 24″01 2*n* β^6 8.7...8.8

3454. Σ 931 *rej.* The principal star is DM (8°) 1395.

1906.03 24°4 23″52 2*n* β^6 9.5...9.7

A and Σ 930 *rej.* (A)

1906.02 276°6 161″68 1*n* β^6

3467. β 194.

1904.11 276°1 1″20 4*n* Doo

3474. OΣ 149.

1902.75 277°2 0″78 2*n* Hu (*Bul. L. O.* No. 40)
1906.18 270.4 0.64 1*n* A

3475. Ho 234. Decided change in angle.

1905.99 24°5 0″39 1*n* A
1906.13 205.5 0.44 4*n* Doo 8.3...8.5

3477. Ho 235. Probably fixed.

1904.06 57°4 3″02 3*n* Doo

3483. Ho 341. No change.

1903.91 135°4 1″65 4*n* Doo

3495. Σ 943.

AB 1904.02 143°3 21″76 3*n* Doo
A*a* 1904.02 283.1 12.97 3*n* Doo

3500. Ho 515.

1903.93 250°8 10″26 3*n* Doo

3536. Ho 236. No change.

1904.06 200°4 16″99 3*n* Doo

3557. Σ 955.

1905.85 274°0 0″99 1*n* A

3560. Ho 237. Doolittle found this certainly single in 1906.

3562. OΣ 154. The proper motion of the principal star, Groombridge 1214, from meridian positions agrees with that given by the measures:

Greenwich 0″164 in 192°8

3593. Ho 238.

1906.08 186°8 0″47 3*n* Doo

3596. *Sirius.*

1906.08 103°8 7″42 2*n* A

3603. Ho 516.

1904.04 221°0 4″55 7*n* Doo 6.9.. 10.2

3617. Howe 16.

1903.55 190°3 3″13 4*n* Doo 8.2...9.5

3630. Ho 239. No material change.

1906.11 131°6 0″45 4*n* Doo
1906.27 138.4 0.51 1*n* A

3650. β 897.

1900.97 28°8 5″89 3*n* Doo

3651. Ho 26. Probably fixed.

1902.07 205°4 5″12 3*n* Doo

3685. Σ 978. The principal star, Groombridge 1241, has a small proper motion:

Greenwich 0″048 in 250°4

This explains the change in the distance of the companion.

3690. OΣ 161 *rej.*

1904.06 170°8 19″69 3*n* Doo

3707. Ho 27. No motion.

AB 1903.82 126°8 3″02 6*n* Doo
AC 1902.57 163.6 33.27 2*n* Doo

3715. β 326.

1902.34 59°6 1″22 7*n* Doo

3717. Ho 28. Fixed.

1904.43 257°6 6″32 6*n* Doo

3727. **O. Stone 16.** No change.
1903.87 94°.2 3″.75 3*n* Doo

3755. **β 1022.**
1906.22 313°.2 0″.40 2*n* A

3792. **Ho 342.** Probably unchanged.
1903.92 76°.5 1″.09 4*n* Doo

3809. **Ho 241.** Probably unchanged.
1905.91 181°.0 8″.22 4*n* Doo

3810. **Ho 29.**
1904.19 157°.0 4″.41 5*n* Doo 9.3...10.0

3833. **H 750.** This appears to be SD (2°) 1923.
1906.40 90°.8 8″.43 1*n* β^6 9.3...9.3

3837. **H 751.**
1906.67 2°.0 13″.66 1*n* β^6 9.0...11.3

3853. **Ho 519.**
1904.85 121°.7 19″.78 3*n* Doo

3856. **Ho 518.** No change.
1901.23 142°.6 2″.81 7*n* Doo

3858. **Σ 1025.**
1905.95 135°.6 24″.07 1*n* β^6

3868. **Σ 1036** *rej.* Lately identified as SD (6°) 1962.
AB 1906.10 105°.0 15″.78 2*n* β^6 9.0... 9.2
BC 1906.07 182.2 10.82 1*n* β^6 ...12.5
The corrected place is:

$$\left.\begin{array}{l}\text{R. A.} = 7^h\ 4^m\ 21^s \\ \text{Decl.} = -\ 6°\ 5'.1\end{array}\right\}$$

3871. **Ho 30.** Without change.
1904.02 125°.8 5″.31 3*n* Doo

3891. **Ho 31.** Without change.
1903.60 9°.4 10″.98 5*n* Doo 9.2...9.6

3897. **Ho 32.** Without change.
1903.60 163°.4 4″.60 5*n* Doo 9.3...9.6

3901. **Σ 1041** *rej.* This is DM (18°) 1529.
1906.06 266°.9 25″.21 2*n* β^6 8.9...11.0

3905. **52** *Geminorum.* **Ho 343.**
1904.04 263°.2 23″.47 3*n* Doo

3937. **Ho 344.**
1904.00 8°.2 0″.89 4*n* Doo

3966. **Σ 1067.**
1906.00 265°.7 25″.85 2*n* β^6

3968. **Ho 33.**
1905.37 331°.6 2″.14 4*n* Doo 9.0...11.5

3976. **Σ 1059** *rej.*
1906.12 304°.6 25″.66 2*n* β^6 8.4...10.3

3989. **Ho 242.** No motion.
1903.82 61°.1 4″.42 3*n* Doo

3991. **Σ 1071.**
1906.10 12°.3 16″.69 2*n* β^6

3992. **Σ 1073.**
1906.02 66°.5 8″.81 3*n* β^6

3998. **β 331.**
1902.73 113°.9 1″.82 5*n* Doo

3999. **Ho 243.** No change.
1904.07 162°.3 1″.78 3*n* Doo

4005. **Ho 345.** No change.
1903.66 281°.5 0″.88 3*n* Doo

4007. **Σ 1080.**
1906.05 221°.0 22″.29 2*n* β^6

4010. **H 419.**
1906.07 41°.7 8″.03 1*n* β^6 9.3...9.6

4012. **Σ 1075.**
1906.12 344°.3 7″.40 1*n* β^6

4017. **H 3291.**

AB	1906.09	115°3	4″92	2*n*	β⁶	9.5... 9.9
AC	1906.09	292.7	17.07	2*n*	β⁶	...11.2

4039. **Σ 1085.**

1901.10	281°0	3″11	4*n*	Doo

4042. **Ho 346.**

1904.78	58°6	13″26	5*n*	Doo

4053. **β 199.**

AB	1902.32	22°5	1″75	7*n*	Doo
AC	1904.08	116.8	5.99	3*n*	Doo

4082. **Arg. 17.**

1906.14	224°7	26″02	1*n*	β⁶	9.0...9.1

4099. **Ho 34.**

1904.45	189°0	1″99	6*n*	Doo	9.3...9.6

4108. **β 22.**

1902.37	149°9	6″43	7*n*	Doo

4164. 70 *Geminorum.* **β 200.**

AB	1900.96	190°6	99″48	3*n*	Loo

4173. **Ho 244.**

1905.88	198°9	12″40	4*n*	Doo	7.3...12.7

4184. **Ho 245.**

1905.62	183°6	0″39	5*n*	Doo

4204. **Ho 523.** Unchanged.

1902.39	322°7	8″77	7*n*	Doo

4207. **See 84.**

1901.88	286°6	8″54	3*n*	Doo	6.7...11.7

4234. **Ho 246.**

1903.50	219°5	2″62	3*n*	Doo

4244. **Ho 247.** Change in angle.

1906.10	123°9	0″43	4*n*	Doo	7.4...8.2

4246. **Ho 347.**

1905.89	280°8	14″62	4*n*	Doo

4252. **Ho 36.**

1906.09	123°3	0″52	5*n*	Doo	8.9...9.1

4264.

1906.72	243°0	23″82	1*n*	β⁶
	A and DM (13°) 1768			
1906.72	215°0	182″12	1*n*	β⁶
	A and DM (13°) 1772			
1906.72	Δ Decl. = 162″72		1*n*	β⁶

4279. **Ho 37.**

1902.09	174°6	1″76	3*n*	Doo

4293. **Ho 248.**

1905.98	93°5	20″38	4*n*	Doo

4310. 9 *Argus.* **β 101.**

1906.02	322°0	0″27	3*n*	A

4346. **Ho 250.**

1906.05	158°3	0″79	3*n*	Doo	7.2...10.5

4355. **OΣ 185.**

1902.87	24°5	0″36	2*n*	Hu (*Bul. L. O.* No. 40)
1906.15	24.5	0.34	1*n*	A

4359. **Sh 86.** The proper motion of the principal star, Groombridge 1388, is given:

Greenwich 0″039 in 72°3

4363. **Σ 1168.**

1900.72	215°2	6″06	4*n*	Doo

4382. **H 2423.**

1906.10	262°9	5″76	3*n*	Doo	8.0...11.0

4408. **Ho 350.**

1906.01	193°0	4″49	3*n*	Doo	8.0...10.8

4414. **β 581.**

AB	1906.11	323°8	0″35	3*n*	A
AC	1906.02	195.2	4.75	1*n*	A

4418. **β 582.**

BC	1902.54	57°2	3″69	6*n*	Doo
AB	1901.09	203.3	20.39	4*n*	Doo

4420. **β 903.**
1902.38 31°.4 1″.57 7*n* Doo

4437. **Ho 351.**
1906.00 236°.1 2″.21 3*n* Doo

4448. **Σ 1184.**
AB 1906.10 340°.6 26″.88 2*n* β^6
A*a* 1906.08 213.7 18.92 1*n* β^6 ...13.5

4451. **Σ 1188.**
1906.10 201°.3 16″.11 2*n* β^6

4471. **H 777.**
1906.25 352°.1 11″.10 1*n* β^6 8.6...10.7

4501. **Σ 1193.** The proper motion is small:
Greenwich 0″.013 in 243°.3

4503. **H 778.** Not in DM, but place substantially correct.
1906.07 140°.4 4″.85 1*n* β^6 10.0...10.4

4505. **OΣ 188.** The proper motion of the large star, Groombridge 1417, is given:
Greenwich 0″.053 in 40°.8

4507. **β 904.**
1901.65 79°.8 3″.31 4*n* Doo

4536. **Ho 39.** Without change.
1904.86 346°.3 6″.24 5*n* Doo

4570. **Σ 1216.**
1906.18 198°.1 0″.36 2*n* A

4594. **Σ 1222.** Certainly fixed.
1906.02 48°.0 9″.91 2*n* β^6

4598. **Schj. 9.** Without change.
1906.07 151°.0 3″.77 1*n* β^6 9.6...9.6

4645. **Σ 1234.**
1906.03 68°.2 22″.41 2*n* β^6

4651. **Σ 1238.**
1906.13 319°.7 29″.23 2*n* β^6

4652. **Σ 1232.**
1906.12 350°.7 31″.08 1*n* β^6

4654. **Σ 1239.**
1906.13 289°.0 12″.70 2*n* β^6

4664. **H 96.** These stars are DM (−0°) 2011, 2012, and 2013.
AB 1906.14 21°.2 39″.34 1*n* β^6 8.8...9.2
AC 1906.14 139.5 59.31 1*n* β^6 ...9.0

4668. **β 205.**
1906.12 227°.6 0″.49 3*n* A

4701. **S 570.**
1905.99 83°.5 57″.22 3*n* β^6

4705. **β 584.**
1901.15 286°.9 1″.58 4*n* Doo

4711. **ε *Cancri*.** **S 574.**
1905.99 249°.3 134″.06 3*n* β^6

4714. **β 208.**
1906.10 177°.3 0″.30 5*n* A

4721. **Σ 1262.**
1906.00 201°.6 6″.85 2*n* β^6

4738. **Ho 529.** Without change.
1906.10 345°.3 0″.61 5*n* Doo

4771. **ε *Hydrae*.**
AB 1906.05 166°.8 0″.23 4*n* A

4851. **β 408.** The proper motion of the large star, Groombridge 1484, is:
Greenwich 0″.026 in 226°.8

4853. **β 103.**
1905.01 68°.4 3″.06 3*n* Doo

4864. **Ho 252.** Doolittle noted this "certainly single" in 1906.

4944. Σ 1313.
1905.31 256°.6 0″.81 2*n* A

4959. H 4182.
1906.25 107°.7 24″.60 1*n* β^6 7.2...10.8

4960. H 806.
1906.25 258°.7 21″.28 1*n* β^6 8.6...10.8

4966. β 104.
1002.58 101°.1 2″.96 6*n* Doo

4983. Σ 1325 *rej.*
1906.10 76°.0 17″.17 2*n* β^6 9.0...11.4

4985. β 908.

BC	1903.29	229°.3	0″.67	5*n*	Doo	
AB	1900.28	184.4	60.77	1*n*	Doo	
BD	1900.28	299.7	35.46	1*n*	Doo	...12.5

5006. OΣ (App) 98. Some change in the distance from proper motion.
1906.17 169°.0 111″.64 3*n* β^6

5018. Ho 43. Motion in angle.
1905.62 290°.5 0″.40 4*n* Doo

5030. Σ 1338. The proper motion of Groombridge 1538 is given:
Greenwich 0″.047 in 262°.7

5055. OΣ 200. The proper motion of Groombridge 1542 is given:
Greenwich 0″.038 in 97°.5

5098. Σ 1352 *rej.*
1906.14 348°.4 18″.65 1*n* β^6 9.5...10.2

5103. *ω Leonis.* Σ 1356. The first three positions by Σ on the diagram are not given in the tabular measures:

1825.21	153°.9	0″.97	5*n*	Σ
1832.25	163.4	0.51	2*n*	Σ
1833.29	172.8	0.45	3*n*	Σ

5112. Σ 1361 *rej.*
1906.10 4°.0 20″.32 2*n* β^6 9.0...9.2

5113. 7 *Leonis Min.* H 1166. No relative motion.
1906.02 129°.0 62″.80 2*n* β^6

5133. Σ 1363.
1906.12 353°.7 10″.63 1*n* β^6

5134. H N. 29.
1904.42 257°.4 32″.55 8*n* Doo 6.6...11.4

5142. Σ 1366.
1906.12 322°.8 7″.95 1*n* β^6

5215. Σ 1383 *rej.* The principal star is DM (32°) 1940.
1906.07 227°.5 22″.52 2*n* β^6 9.0...11.2

5221. Σ 1384.
1906.08 182°.2 11″.87 2*n* β^6

5223. *φ Ursae Majoris.* OΣ 208.

1902.47	287°.6	0″.32	3*n*	Hu (*Bul. L. O.* No. 40)
1905.35	294.3	0.32	2*n*	A

5224. Ho 369.

1906.15	113°.1	0″.32	2*n*	Doo
1906.32	119.2	0.22	2*n*	A

5231. Σ 1388 *rej.*
1906.17 121°.6 33″.55 2*n* β^6 8.4...10.0

5249. Σ 1392.
1906.17 174°.6 9″.32 2*n* β^6

5282. H 2515. Other stars in the field more distant.
1906.14 9°.6 51″.66 1*n* β^6 7.5...12.0

Another pair 24^s *f* and 14′ *n* was measured by mistake for H 2515. This is not in Part I. There is a 14 m star near B, 358°.6 : 11″.4.
1906.12 231°.0 28″.24 2*n* β^6 7.0...12.6

5301. Ho 370. The late measures give a larger distance.
1906.08 330°.2 15″.65 4*n* Doo 6.6...12.2

5327. Weisse 23.
1906.17 312°.0 3″.45 2*n* β^6 9.1...9.2

5347. Σ 1413.
1906.17 275°.9 2″.05 2*n* β^6

5348. Σ 1414.
1906.12 93°.6 3″.87 1*n* β^6

5355. **H 4296.**
1906.07 140°9 15″74 2*n* β^{6} 9.1...11.1

5365. **OΣ 215.**
1902.46 210°0 0″95 2*n* Hu (*Bul. L. O.* No. 40)

5391. **H 158.**
1906.10 165°9 20″53 2*n* β^{6} 9.4...11.7

5393. **H 159.**
1906.10 10°8 41″51 2*n* β^{6} 8.4...10.9

5442. **H 2532.**
1906.17 69°4 13″06 2*n* β^{6} 9.4...9.4

5468. **Σ 1443.**
1906.17 159°8 4″92 2*n* β^{6}

5477. **S 510.** The apparent change is confirmed by the positions in O. Arg. S. which give, 40°2 : 102″5 (1850).

5487. **Σ 1452.**
1906.22 332°5 10″34 1*n* β^{6}

5501. **Σ̄ 1454.** The proper motion of the principal star is:
Porter 0″202 in 103°2

5510. **H 488.**
1906.12 20°1 28″77 1*n* β^{6} 8.2...11.5

5514. **Σ 1459.**
1906.12 152°2 5″31 1*n* β^{6}

5523. **Σ 1461.**
1906.10 136°2 9″13 2*n* β^{6}

5529. **Σ 1463.**
1906.10 258°5 7″57 2*n* β^{6}

5545. **Σ 1467.** The proper motion of Groombridge 1682 is given:
Greenwich 0″036 in 291°2

5596. **Σ 1485** *rej.*
1906.06 222°4 19″15 2*n* β^{6} 8.5...10.8

5652. *a Ursae Majoris.* **β 1077.** Aitken with the 36-inch could see no trace of the companion 1905.27.

5679. **Σ 1510.** The proper motion of Groombridge 1737 is:
Greenwich 0″080 in 272°9

5694. **H 2562.**
1906.12 315°6 1″44 2*n* β^{6}

5749. **H 2566.**
1906.08 152°6 16″64 2*n* β^{6} 9.3...12.1

5751. **H 496.** From *Mon. Not.* LXVI, 142.
1905.24 328°9 28″28 2*n* Es 9.0...9.8

5754. **H 2567.** This is DM (70°) 656.
1906.14 232°3 14″17 1*n* β^{6} 9.5...10.8

5787. **Σ 1539.** The proper motion of the principal star is:
Greenwich 0″051 in 34°4

5798. **H 4572.** Without change.
1906.14 181°1 36″80 1*n* β^{6} 9.5...10.5

5805. **OΣ 234.**
1905.34 149°6 0″39 1*n* A

5806. **Σ 1544.**
1906.14 89°2 12″11 1*n* β^{6}

5811. **OΣ 235.** This star, Groombridge 1797, is given a small proper motion:
Greenwich 0″081 in 181°0
1902.47 135°0 0″47 3*n* Hu (*Bul. L. O.* No 40)

5815. **Σ 1548.**
1906.30 127°0 10″82 1*n* β^{6}

5828. **Σ 1550** *rej.*
1906.18 55°2 21″71 2*n* β^{6} 8.4...10.2

5848. **β 456.**
1906.32 340°4 0″28 2*n* A

5854. **Σ 1559.** The proper motion of Groombridge 1809 is:

Greenwich 0″.027 in 63°.5

5941. **H 842.**

1906.03 90°.3 2″.87 1*n* β^6 8.5...8.9

5969. **Σ 1581.**

1906.03 173°.0 2″.30 1*n* β^6

5971. **Σ 1585.**

1906.14 105°.2 5″.52 2*n* β^6

5975. **Σ 1586.** The proper motion of Groombridge 1839 is given:

Greenwich 0″.047 in 254°.0

5989. **Σ 1587** *rej.*

1906.14 289°.2 16″.75 2*n* β^6 8.6...10.6

6021. **Σ 1598** *rej.*

1906.16 44°.4 42″.20 2*n* β^6 8.2...10.7

6062. **Σ 1610** *rej.*

1906.12 330°.8 29″.25 2*n* β^6 8.4...10.2

6093. **H 1214.**

AB 1906.25 339°.6 13″.08 2*n* β^6 9.1...11.6
AC 1906.25 188.0 18.25 2*n* β^6 ...11.3

6110. **H 2606.**

1906.12 168°.3 10″.90 2*n* β^6 9.7...12.3

6117. **Espin 74.** This cannot be DM (41°) 2588, as given by Espin, unless there is an error of about 2^h in his R. A.

6120. **Σ 1629** *rej.*

1906.28 299°.6 25″.38 3*n* β^6 8.7...10.8

6137. **H 517.**

1906.11 252°.0 20″.62 2*n* β^6 8.7...11.2

6146. **Wn 4.** The principal star, Groombridge 1878, has a small proper motion:

Greenwich 0″.035 in 239°.3

6188. **H 519.** Espin (*Mon. Not.* LXVI, 142) gives:

1905.29 4°.7 19″.84 2*n* Es 9.1...9.3

6202. **H 1217.**

1906.30 308°.9 31″.93 1*n* β^6 8.5...11.0

6214. **H 1218.**

1906.30 262°.0 11″.59 2*n* β^6 7.3...10.5

6249. **Σ 1673** *rej.* There is a nearer companion 13 m, 117°.3:16″.7.

1906.25 81°.4 31″.43 2*n* β^6 8.5...10.0

6263. **Σ 1678.** There appears to be an error in Rechenberg's proper motion of B from reducing the position in Weisse. This star has practically no motion in R. A. The proper motion of A in *A. G. Berlin* is:

0″.064 in 292°.8

With this value, and the relative change shown by the measures, the proper motion of B is:

0″.071 in 111°.9

6296. **35** *Comae.* **Σ 1687.**

1906.31 82°.2 1″.11 3*n* A

6303. **Σ 1694.** The Greenwich proper motion of A is in a different direction:

0″.031 in 6°.0

6342. **46** *Virginis.* **A. G. C. 5.** Change from proper motion.

AC 1906.22 121°.8 35″.31 3*n* β^6

6365. **H 2632.** Change in angle?

1906.11 347°.1 31″.15 2*n* β^6 8.7...11.7

6370. **H 2634.**

1906.12 52°.5 31″.18 1*n* β^6 9.5...12.5

6372. **H 1226.** This is DM (41°) 2352.

1906.11 191°.5 11″.98 2*n* β^6 9.5...9.5

6387. **H 2639.**

AB 1906.12 161°.0 31″.34 1*n* β^6 8.0...10.8
AC 1906.12 136.5 47.23 1*n* β^6 ...10.3

6389. **β 799.** The proper motion of this star, Groombridge 1960, is:

Greenwich 0″040 in 324°9

6406. 42 *Comae.* **Σ 1728.**

1906.30 11°5 0″68 3*n* A

6412. **OΣ (App) 121.** The proper motion of the large star is:

Greenwich 0″028 in 228°1

6413. **Σ 1729.** Aitken has recently found the principal star to be a close pair.

A and B

1906.50 120°8 0″29 3*n* A 8.9...10.3

AB and C

1906.47 274°8 8″46 1*n* A

6428. **Ho 55.**

1905.80 163°1 0″7 7*n* Doo 7.5...11.5

6439. **H 2648.**

1906.26 98°4 42″61 2*n* β⁶ 8.2...11.0

6449. **H 222.**

1906.37 142°7 29″54 1*n* β⁶ 9.0...10.2

6451. **H 2649.**

1906.25 344°6 22″78 1*n* β⁶

6504. **Σ 1749** *rej.*

1906.11 352°8 21″62 2*n* β⁶ 8.5...10.7

6514. **Σ 1754** *rej.*

1906.25 32°4 23″47 1*n* β⁶ 8.3...10.5

6530. **Σ 1757.**

1906.32 79°9 2″54 2*n* A

6544. **H 2662.** No change since 1879.

1906.12 285°1 25″07 1*n* β⁶ 9.0...9.2

6553. **H 3340.**

1906.25 212°4 2″02 2*n* β⁶ 10.4...10.6

6573. **Σ 1770.** The proper motion is:

Greenwich 0″036 in 287°6

6578. **β 612.** The motion in angle is now very rapid.

1906.31 354°7 0″13 4*n* A

From the measures to 1906 Aitken finds a period of 34.4 years. He gives the following ephemeris:

1907.3	16°3	0″17
1908.3	28.4	0.21
1909.3	36.7	0.24
1910.3	43.4	0.26
1911.3	49.4	0.27
1912.3	55.2	0.27

6602. **Σ 1778** *rej.*

1906.12 203°2 28″42 2*n* β⁶ 8.9...11.0

6641. **Σ 1785.**

1906.42 304°4 1″24 2*n* A

6663. **β 614.**

1902.53 257°9 0″38 3*n* Hu (*Bul. L. O.* No. 40)

6683. **Σ 1792.**

1906.21 294°7 2″08 2*n* β⁶

6685. **H 535.**

1906.21 154°6 40″01 2*n* β⁶ 8.8...11.3

6691. **H 2694.**

1906.27 83°8 39″83 1*n* β⁶

6711. **β 1270.** Rapid motion in angle.

1906.30 54°1 0″18 3*n* A

6712. **Σ 1800** *rej.* Aitken finds the large star to be a close pair (see No. 13257). This is the only measure of the Struve companion:

1906.26 20°2 27″67 2*n* β⁶ 7.5...10.5

6751. **H 1247.**

1906.11 135°1 5″96 2*n* β⁶ 8.7...10.2

6767. **H 2704.**

1906.11 350°2 42″85 2*n* β⁶ 8.5...11.9

6780. **Σ 1819.**

1906.31 348°4 1″25 2*n* A

6796. **DM** (24°) 2711.

1906.31 79°9 3″32 1*n* β^6

6800. **H** 4670.

1906.37 23°7 18″99 1*n* β^6 8.5...11.5

6803. **β** 1246.

AC 1906.37 96°4 41″31 1*n* β^6

6818. **Σ** 3083. On this occasion A. G. 194 (No. 6822), which is near the other, was not seen double.

1906.30 231°7 4″69 2*n* β^6

6829. **Σ** 1836 *rej.*

1906.11 110°6 21″52 2*n* β^6 9.3...9.6

6841. **Σ** 1839.

1906.33 261°0 14″41 1*n* β^6

6865. **Σ** 1851.

1906.37 331°7 10″65 1*n* β^6

6869. Recent measures are:

AB	1906.12	74°1	45″19	3*n*	β^6
AC	1906.18	119.9	178.56	6*n*	β
AD	1906.16	246.8	156.05	3*n*	β
C*a*	1906.21	181.8	55.91	3*n*	β

To determine hereafter whether or not C has any proper motion, the 12.2 m star is measured.

The A. G. position and the four sets of measures of AD give for the proper motion of A:

1″395 in 145°3

The micrometer measures alone (1903 to 1906) give a larger value:

1″696 in 136°1

From the Berlin and Cincinnati meridian positions Porter finds:

1″381 in 143°5

[A. N. 3824, 3827, 3831...]

6872. **Σ** 1849. The proper motion of Groombridge 2112 is given:

Greenwich 0″042 in 260°3

6874. **Σ** 1845 *rej*

1906.15 313°8 34″38 2*n* β^6 8.0...10.8

6879. **Ho** 542.

1906.27	79°1	0″57	4*n*	Doo
1906.32	78.2	0.52	2*n*	A

6913. **A** 570. Rapid change in angle.

1906.32 172°6 0″24 2*n* A

6917. **H** 554. Measures by Espin (*Mon. Not.* LXVI, 142). C not mentioned.

1905.38 294°4 12″05 2*n* Es 9.2...9.5

6920. **Σ** 1859 *rej.*

1906.36 235°0 19″84 2*n* β^6 8.3...9.1

6942. **H** 2738.

AB	1906.36	266°3	9″00	2*n*	β^6	8.3...10.6
BC	1906.36	205.9	6.74	2*n*	β^6	...13.2

6966. **Σ** 1880 *rej.*

1906.20 246°4 22″56 2*n* β^6 9.0...10.2

7001. **OΣ** 285. The proper motion is given:

Greenwich 0″131 in 300°7

1902.44	125°5	0″38	3*n*	Hu (*Bul. L. O.* No. 40)
1906.27	115.2	0.34	1*n*	A

7004. **Σ** 1882. The proper motion of Groombridge 2150 is given:

Greenwich 0″048 in 170°5

7032. **Σ** 1889 *rej.*

1906.13 87°6 15″61 2*n* β^6 6.5...9.8

7039. **Hn** 120. Distance less.

1906.21 222°7 23″35 3*n* β^6

7044. **OΣ** 287.

1902.44 321°5 0″86 3*n* Hu (*Bul. L. O.* No. 40)

7049. **OΣ** 288.

1902.44 191°4 1″62 3*n* Hu (*Bul. L. O.* No. 40)

7103. **OΣ** 291 *rej.* The proper motion is given:

Greenwich 0″036 in 287°8

7106. **S** 666. The proper motion of the principal star is:

Greenwich 0″023 in 280°0

7116. **H** 565. In Herschel's General Catalogue (Mem. R. A. S. XL) the declination is about 10′ more than that in the original catalogue. Hence this is probably the 8.2 m star, DM (34°) 2598, the place of which is:

R. A. = $14^h\ 59^m\ 33^s$
Decl. = 34° 2′

1905.38 104°6 33″19 2*n* Es 8.1...10.5

7169. **H 1269.**
1906.23 248°.5 24″.50 3*n* β^6 8.6...11.2

7170. **H 1270.**
1906.23 160°.8 14″.43 3*n* β^6 8.5...10.6

7227. **Σ 3092.**
1906.31 165°.7 14″.26 3*n* β^6

7243. **H 2777.**
1906.12 345°.1 40″.85 2*n* β^6 8.0...10.9

7251. *η Coronae Borealis.* **Σ 1937.**
1906.38 26°.4 1″.02 3*n* A

7259. *μ^2 Bootis.* **Σ 1938.**
1906.22 62°.1 1″.02 2*n* A

7296. **Σ 1949.**
1906.41 213°.9 16″.49 3*n* β^6

7299. **β 944.** The proper motion of Groombridge 2239 is:
Greenwich 0″.040 in 136°.1

7307. **Σ 1953.**
1906.41 253°.0 6″.53 3*n* β^6

7312. **Hn 122.** No motion.
1906.41 341°.4 2″.23 1*n* β^6

7315. **H 2886.** Measures by Espin (*Mon. Not.* LXVI, 142):
1905.38 166°.8 24″.53 2*n* Es 8.1...11.5

7332. **OΣ 298.**
1902.44 182°.2 1″.13 3*n* Hu (*Bul. L. O.* No. 40)
1906.22 187.9 1.16 2*n* A

7361. **OΣ (App) 141.** The proper motion of A is:
Greenwich 0″.013 in 193°.8

7360. **Hu 580.**
1906.43 79°.6 0″.16 2*n* A

7368. *γ Coronae Borealis.* **Σ 1767.**
1906.43 119°.2 0″.71 2*n* A

7375. **Σ 1969.**
1906.26 52°.8 0″.60 2*n* A

7383. **H 2791.**
1906.34 129°.2 11″.32 2*n* β^6 9.5...13.0

7416. *π^2 Ursae Minoris.* **Σ 1989.**
1906.34 111°.1 0″.12 1*n* A

7420. **H 2794.** The angles disagree.
AB 1906.25 143°.7 23″.24 2*n* β^6 8.7...12.0
AC 1906.25 38.8 22.96 2*n* β^5 ...13.7

On both nights the companion to H 2799 (No. 7445) was invisible.

7464. **Σ 2002** *rej.*
1904.41 320°.7 43″.89 1*n* β^6 8.4...9.0

7479. **H V. 75.**
1906.40 110°.5 47″.69 3*n* β^6

7487. *ξ Scorpii.* **Σ 1998.**
1906.38 68°.7 0″.23 4*n* A

β 949. "Too close to measure," A (1906.30).

7509. **Glasenapp 4.** Identified as Cord. DM (27°) 10817, the place of which is:

R. A. = 16^h 2^m 18^s
Decl. = − 27° 35′

1906.46 289°.2 56″.16 1*n* β^6 8.3...10.5

7510. **Glasenapp 5.** This should be in the field with the last preceding pair. There is nothing there, and the only pair found in the vicinity is Cord. DM (27°) 10778, the place of which is:

R. A. = 15^h 59^m 36^s
Decl. = − 27° 24′

If this is the right star, there has been a decided change in angle and distance.

1906.46 220°.5 36″.13 1*n* β^6

7511. **H 4834.** Distance less.
1906.46 16°.0 17″.93 1*n* β^6 9.7...9.8

7515. **OΣ (App) 142.** The proper motion of the large star, Groombridge 2309, is given.
Greenwich 0″.021 in 259°.1

7525. **Σ 2012** *rej.*
1906.35   237°0   21″34   1*n* β^6 8.4...10.5

Mitchel has a measure ascribed to this, which belongs to some other star.
1848.60   349°6   32″61   1*n*   Mh   9.0...11.0

7526. **Ho 550.**
1906.35   298°8   15″90   3*n* β^6 8.3.. 13.7

7545. **Σ 2018** *rej.* This was measured by Mitchel:
1848.60   355°5   20″95   1*n*   Mh   9.0...11.0

7550. **Σ 2019** *rej.* This was measured by Mitchel; the angle is 180° in error.
1848.60   334°9   21″71   1*n*   Mh   7.5...9.5

7553. **Σ 2024** *rej.* The principal star, Groombridge 2318, has a small proper motion:
Greenwich   0″045 in 232°4

7561. **Σ 2026.** Rapid motion in angle.
1906.39   190°7   0″38   3*n*   A
1906.41   195.7   0.40   1*n* β^6

7562. **Σ 2031** *rej.* Error of 180° in angle by Mitchel.
1848.60   50°4   22″26   1*n*   Mh   8.0...10.0

7632. **Σ 2054.** The proper motion of this star, Groombridge 2345, is given:
Greenwich   0″047 in 315°8

7650. **Hu 663.** The proper motion of Groombridge 2350 is:
Greenwich   0″038 in 329°5

7653. **Hu 748.** The proper motion of Groombridge 2351 is:
Greenwich   0″025 in 61°7

7657. **Ho 406.**
AB   1906.25   348°7   6″45   3*n* β^6
AC   1906.25   21.8   26.30   3*n* β^6

7717. *ζ Herculis.* **Σ 2084.**
1906.36   178°7   1″10   3*n*   A

7719. **See 285.**
1906.46   259°6   14″12   1*n* β^6

7720. **H 1293.**
1906.32   103°6   6″70   2*n* β^6 10.6...11.3

7726. **β 953.** Rapid motion.
1906.34   183°6   0″14   1*n*   A

7742. **Σ 2099.**
1906.41   217°9   9″72   3*n* β^6

7748. **⅃ 15.**
1906.22   301°1   0″52   2*n*   A

7783. **Σ 2107.**
1906.36   356°5   0″45   3*n*   A

7792. **Ku 1.** The proper motion of this star, Groombridge 2391, is given:
Greenwich   0″220 in 15°3

7798. **Σ 3106.**
1906.41   68°6   2″14   1*n* β^6

7818. **H 2802.**
1906.40   126°5   11″87   2*n* β^6 9.6...12.2

7820. **H 588.**
1906.28   100°5   24″04   2*n* β^6 9.3...11.5

7828. **Σ 2116.**
1906.41   5°5   18″84   1*n* β^6

7838. **Σ 2113.** No change.
1906.34   117°3   4″86   3*n* β^6

7842. **H 263.** There is a pair of 12 m stars in the field *p*, 120°8: 19″7; this probably is H 262.
1906.25   114°7   18″50   2*n* β^6 9.6...10.8

7870. **H 4922.** There is a 13.5 m star in 265° about the same distance as B.
1906.51   311°0   22″04   2*n* β^6 7.7...10.7

7884. **H 589.** No motion.
1906.46   302°1   10″03   1*n* β^6

7929. **β 416.**
1906.46 276°9 2″30 1*n* A

7957. *ν Serpentis.* **Sh 247.**
1906.54 29°7 47″02 4*n* β^6

7958. **A 28.**
1906.28 41°3 1″62 3*n* Doo

7962. **Σ 2155.** The proper motion of Groombridge 2432 is given:
Greenwich 0″035 in 4°8

7976. 72 *Herculis.*
1906.41 333°6 213″50 3*n* β^6

The proper motion from the six sets of measures (1853 to 1906) is:
1″021 in 170°8

7986. **Σ 2157.** The proper motion is given:
A. G. Berlin 0″059 in 227°2

8096. **Hu 182.**
1906.26 6°0 1″03 4*n* Doo 9.0...9.0

8099. 26 *Draconis.* **β 962.**
1906.18 355°1 1″10 1*n* A

8127. **Σ 2203.** This star, Groombridge 2458, has a small proper motion:
Greenwich 0″026 in 276°6

8139. **Σ 2210.** There is no motion since 1831.
1906.33 123°2 3″12 3*n* β^6

8162. *μ Herculis.* **A. G. 7.**
1906.32 75°0 1″24 4*n* β^6
1906.45 72.3 1.34 3*n* A

8206. **Σ 2237.** This star has a small proper motion:
Greenwich 0″045 in 211°0

8209. **Σ 3128.** The proper motion is given:
Paris 0″218 in 180°0
Porter 0.234 in 190.2

8218. **β 964.** The proper motion is small:
Greenwich 0″028 in 351°9

8230. **A 235.** Direct motion in angle.
1906.48 75°2 0″34 2*n* A

8245. **Ho 72.**
AB 1906.32 3°2 8″37 5*n* β^6
AC 1906.33 37.5 9.37 3*n* β
BC 1906.33 97.6 5.57 3*n* β

The six sets of measures of AB (1885–1906) give the small star a proper motion of 0″241. There is probably no change in AC.

8287. **Espin 20.** A is reddish.
1906.30 227°0 14″81 2*n* β^6 9.9...9.9

8331. **β 1127.**
1906.44 127°3 0″85 1*n* A

8340. 70 *Ophiuchi.* **Σ 2272.** Do (4115) has two orbits, from measures to 1905, giving 88.47 and 87.49 years.
1906.41 170°4 2″31 2*n* A

8348. **Σ 2276.** The proper motion of the principal star, Groombridge 2502, is given:
Greenwich 0″032 in 84°6

8353. **OΣ 341.**
1902.47 89°6 0″35 3n Hu (*Bul. L. O.* No. 40)

8391. **OΣ 344.** Groombridge 2518 is given a small proper motion:
Greenwich 0″020 in 72°8

8414. **β 131.**
AB 1906.56 281°6 2″91 2*n* β^6
AC 1906.56 284.0 7.62 2*n* β^6

8420. **Σ 2302.** Small proper motion:
Greenwich 0″021 in 13°5

8433. **Σ 2294.**
1906.27 98°8 0″41 1*n* A

8476. **β 1274.** There is a small proper motion in Groombridge 2539:
Greenwich 0″035 in 357°3

8503. Espin.
1906.32 330°.2 7″.57 3*n* β^6 8.4...12.2

8535. A. C. 11.
1906.27 182°.9 0″.16 1*n* A

8596. Hd. Zones. No motion.
1906.41 216°.0 5″.82 2*n* β^6

8647. See 355.
1906.56 240°.8 12″.37 1*n* β^6 7.7...13

8669. Σ 2348. Very recently Aitken has found the principal star of Σ 2348 to be a close pair.
AB 1906.42 269°.3 0″.15 3*n* A 6.0...6.0

8679. A 88. The rapid motion continues; certainly a short-period binary.
1906.30 197°.7 0″.09 2*n* A

8698. Ho 87.
1906.54 289°.7 0″.42 3*n* Doo

8713. Σ 2365 *rej.* These stars seem to have a common proper motion.
1906.32 24°.9 19″.74 3*n* β^6 8.1...10.2

8739. H 2836. The proper motion of Groombridge 2642 is given:
Greenwich 0″.043 in 4°.9

8746. Σ 2377 *rej.* The large star has some proper motion:
Greenwich 0″.044 in 316°.6

8775. Σ 2380. Groombridge 2646 has a small proper motion:
Greenwich 0″.039 in 247°.5

8792. Σ 2393. The proper motion of the principal star, Groombridge 2662, is:
Greenwich 0″.038 in 277°.5

8849. β 971. Aitken could not see it double with the 36-inch on two nights in 1906.44.

8884. Σ 2413.
1906.46 200°.7 9″.95 3*n* β^6

8897. H 2845.
1906.55 6°.2 3″.69 3*n* β^6 8.4...10.2

8933. β 648.
1906.37 190°.2 0″.58 2*n* A

8941. H 1357. The larger star, Groombridge 2722, has a small proper motion:
Greenwich 0″.026 in 333°.4

8965. *ζ Sagittarii.*
1906.56 278°.8 0″.40 3*n* A

8966. Σ 2438. The system is given a proper motion:
Greenwich 0″.060 in 50°.9

8977. Σ 2440. The proper motion of Groombridge 2742 is:
Greenwich 0″.057 in 165°.0

8993. ♅ N. 126.
1906.56 285°.8 0″.52 2*n* A

9011. Σ 2450. The large star, Groombridge 2753, has some proper motion:
Greenwich 0″.051 in 236°.6

9020. *ζ Aquilae.* **β 287.**
1906.46 56°.9 5″.64 2*n* β^6

9072. H 1367. No change.
AB 1906.59 62°.7 13″.80 2*n* β^6 8.5...10.6
AC 1906.59 293.6 25.44 2*n* β^6 ...11.7

The pair referred to from Cin[5] is wrongly identified in that list. This star is SD (17°) 5535, and is *nf* H 1367. The place is:

$$\left.\begin{array}{l}\text{R. A.} = 19^h\ 7^m\ 54^s\\ \text{Decl.} = -17^\circ\ 33'\ 5''\end{array}\right\}$$

1906.56 78°.3 27″.91 1*n* β^6 7.0...10.5

9114. Σ 2481.
BC 1906.42 112°.8 0″.26 3*n* A

9150. Hn 34. The proper motion of Groombridge 2793 is:
Greenwich 0″.030 in 36°.9

9185. **Σ 2496.** Groombridge 2802 has a very small proper motion:

Greenwich 0″017 in 249°9

9196. **Espin.**

1906.44 115°9 6″23 3*n* β^6 8.8...11.2

9199. **Espin.**

1906.44 114°1 7″11 3*n* β^6 9.1...12.0

9235. **Σ 2509.** There is a small proper motion:

Greenwich 0″030 in 95°7

9276. **β 1129.** The Greenwich proper motion is smaller:

0″020 in 117°2

9294. 4 *Vulpeculae.* **H 2871.** The companion is not moving with the large star.

1906.44 105°9 24″19 3*n* β^6

9317. **β 1286.**

AB 1906.37 106°5 6″09 4*n* β^6

A distant 11 m star measured for an independent determination hereafter of the proper motion:

AD 1906.34 38°1 37″02 3*n* β^6
BD 1906.34 28.9 35.42 3*n* β^6

9339. **H 2873.**

AB 1906.36 303°4 9″28 2*n* β^6 9.6...11.1
AC 1906.36 198.5 12.78 2*n* β^6 ...11.5

9375. **H 2878.** There is probably an error of 90° in the angle of H.

1906.50 164°1 18″89 3*n* β^6 9.3...11.2

9381. **Σ 2536.** The proper motion is:

A. G. Berlin 0″130 in 189°5

9387. **β 143.** The proper motion of Groombridge 2858 is:

Greenwich 0″036 in 43°3

9405. **H 2882.** Fixed.

1906.43 131°5 9″69 2*n* β^6 9.0...10.5

9463. **Σ 2554.**

1906.41 195°5 18″48 2*n* β^6

9503. **H 894.** Distance larger?

1906.32 113°2 8″82 3*n* β^6 10.3...10.6

9512. **Ho 111.**

1906.11 356°8 0″75 5*n* Doo 6.7...11.4

9517. **Espin.**

1906.41 23°5 8″87 2*n* β^6 8.5...10.7

9527. **Howe 50.** Wrongly identified in Cin^5. It is not Schj. 7549, but DM (4°) 4199, which is 22^s *f* and 4′4 *n.* Probably fixed.

1906.30 16°6 2″24 3*n* β^6 9.5...9.8

9539. **H 2892.**

1906.30 89°9 12″56 2*n* β 8.4...11.1

9648. **λ** *Ursae Minoris.* **H 2985.**

1906.46 268°7 54″75 2*n* β^6 ...12.5

9650. **OΣ 387.**

1902.58 335°4 0″64 3*n* Hu (*Bul. L. O.* No. 40)

9660. **A 718.** The proper motion of Groombridge 2944 is:

Greenwich 0″033 in 150°9

9699. **H 1488.**

1906.34 168°2 11″26 2*n* β^6 9.3...9.3

9741. **Hd 155.** These stars are SD (9°) 5303 and 5304. Each has a small companion.

AB 1906.55 120°1 114″25 3*n* β^6
A*a* 1906.55 112.5 10.29 3*n* β 7.7...10.3
B*b* 1906.55 158.2 5.53 3*n* β 8.4...10.8

9749. **Hu 687.** Groombridge 2979 is given a small proper motion:

Greenwich 0″033 in 60°8

9764. **Espin 131.** Espin's identification and place are incorrect. This is the same as Arg. 35 (No. 9806).

9768. **H 2912.** Probably fixed.

1906.56 135°8 16″63 2*n* β^6 9.0...10.0

9779. **Ho 582.**

1906.40 146°2 0″25 4*n* Doo 8.7...8.7

9782. **OΣ 392.** The large star, Groombridge 2989, has a small proper motion:

Greenwich 0″026 in 200°4

9786. **OΣ 393.** The principal star, Groombridge 2995, has a proper motion:

Greenwich 0″046 in 204°8

9834. **Σ 2615.**

1906.35 315°9 9″82 3*n* β⁶

9902. **HΣ.** A recent search for this shows that DM (38°) 3895 is not a double of any kind. There are many small pairs in the vicinity, but nothing found answering the description in HΣ. DM (38°) 3898, 5ˢ *f* and 14′9 *n* has a small companion:

1906.31 334°6 8″29 1*n* β⁶ 9.3...11.5

The 6.8 m star, DM (38°) 3896, which is 13′ exactly *s* of 3895, has a faint attendant:

1906.31 230°2 12″37 2*n* β⁶ 7.0...13.6

9926. **Σ 2628.** This is H II. 29.

9935. **Σ 2640.** The principal star, Groombridge 3051, has a small proper motion:

Greenwich 0″052 in 15°7

1906.34 21°6 5″10 3*n* β⁶

9950. **Σ 2635.**

1906.34 77°3 7″32 3*n* β⁶

9979. **OΣ 400.**

1906.45 358°3 0″37 1*n* A

10029. **H 910.**

AB 1906.43 320°2 13″96 2*n* β⁶
AC 1906.43 246.7 28.61 2*n* β⁶

10032. **Ho 589.**

AB 1906.65 324°5 15″62 2*n* β⁶
AC 1906.65 201.1 56.11 1*n* β⁶

10063. **β 442.** The positions of these and other stars in this coarse cluster are given by Bellamy from measures of a photograph made at the Oxford Observatory (*Mon. Not.* LXIV, 663). Nos. 39, 43 and 45 are respectively A, B and C. The doubtful star referred to in the note on p. 668 appears to be *e* of the micrometer measures.

10069. **Ho 590.**

AB 1906.35 210°0 3″29 2*n* β⁶
AC 1906.35 83.8 25.72 2*n* β⁶

10091. **Barnard 11.**

AB 1906.44 201°0 0″31 1*n* A

10133. **Arg. 38.**

1906.62 272°9 17″71 1*n* β⁶ 9.3...9.7

10135. **Σ 2671.** The proper motion in *A. G. Harvard* is much too large according to the observations of Groombridge 3142:

Greenwich 0″032 in 204°0

10140. **Σ 2668.** Aitken has recently divided the principal star:

A and B
1906.55 111°9 0″25 3*n* A 7.0...9.0
AB and C
1906.54 286°3 3″26 2*n* A

10141. **OΣ 406.** The proper motion of Groombridge 3141 is given:

Greenwich 0″041 in 163°3

10148. **β 1259.**

1905.86 173°9 0″51 2*n* A

10149. **β 1260.**

1906.45 164°2 0″47 2*n* A

10180. **OΣ (App) 207.** (AB = Ho 128.)

AB 1906.30 33°9 1″22 1*n* β⁶
AC 1906.30 63.3 93.85 3*n* β⁶

The measures of AC give for the proper motion of A:

1″086 in 55°4

10232. **A. G. 256.**

1906.70 352°2 4″80 1*n* β⁶

10251. **A 731.** The proper motion of Groombridge 3192 is:

Greenwich 0″030 in 74°6

10252. **H 1517.** Distance greater.
1906.30 105°6 12″68 2*n* β^6 9.4...9.5

10275. **Σ 2688.** Distance appears to be increasing.
1906.33 174°4 6″45 3*n* β^6

10282. **H 1525.** There is a 13.5 m star, 36°7 : 17″4.
1906.34 233°0 8″61 3*n* β^6 8.9...9.1

10291. **A 733.** The proper motion of Groombridge 3203 is given:
Greenwich 0″038 in 189°0

10300. **H 1527.**
1906.31 280°2 8″51 1*n* β^6 10.5...10.5

10335.
1906.35 52°5 58″26 4*n* β^6

10346. **Ho 279.**
1906.72 172°6 8″28 3*n* β^6 9.4...11.8

10355. **A. G. 258.**
1906.72 11°4 3″95 3*n* β^6 9.0...9.3

10363. **β** *Delphini.* **β 151.**
1906.44 91°5 0″18 3*n* A

10367. **71** *Aquilae.* **β 672.**
1906.45 282°3 31″96 3*n* β^6 ...12.3

10374. **H 920.**
1906.39 211°5 14″32 2*n* β^6 9.6...10.0

10411. **Espin 89.**
1906.34 200°1 16″32 3*n* β^6 7.0...11.9

10426. **Σ 2717.** The proper motion of Groombridge 3250 is:
Greenwich 0″050 in 67°6

10438. **Σ 2719** *rej.* The only measure is:
1906.33 140°9 14″12 3*n* β^6 8.5...9.9

10477. **Arg. 39.** For determining hereafter which of the components has the proper motion, I have measured a third star.
AB 1906.51 113°2 9″61 3*n* β^6
BC 1906.52 126.5 31.02 2*n* β^6 ...12.5

10492. **Ho 140.** The principal star, Groombridge 3266, has a small proper motion:
Greenwich 0″027 in 193°5

10531. **Ho 143.** This star, Groombridge 3278, has a small proper motion:
Greenwich 0″042 in 232°0

10535. *η Cephei.* There is a faint star between.
1906.35 40°1 80″72 4*n* β^6

10543. **Ho 280.**
1906.51 77°9 13″56 2*n* β^6

10554. **Espin 31.** The principal star, DM (32°) 3954, is decidedly reddish.
AB 1906.51 243°0 10″58 3*n* β^6 9.1...10.0
AC 1906.51 140.5 18.33 3*n* β^6 ...10.7

10556. **H 1579.** The *f* star is the smallest.
1906.52 122°2 4″63 3*n* β^6 9.4...9.7

10559. **4** *Aquarii.* **Σ 2729.**
1906.49 295°4 0″25 2*n* A

10648. **H 928.** If the measure of 1879 is correct, there has been a decided change in distance.
1906.51 81°5 14″96 2*n* β^6 9.4...11.3

10701. **H 5244.**
1906.52 133°2 13″75 3*n* β^6 9.3...9.5

10713. **Σ 2751.** Groombridge 3378 has a small proper motion:
Greenwich 0″043 in 106°0

10725. **Σ 2754.** Change from proper motion.
1906.54 301°2 32″46 3*n* β^6

10750. **H 3011.** The companion is exceedingly faint and difficult. It could not have been seen by Herschel.
1906.58 230°7 17″51 2*n* β^6 ...14.8

10756. 63 *Cygni.* **Espin 32.** This star has a proper motion of 0″.019 in 136°.6.

1906.49 155°.1 15″.71 2*n* β^6 ...13.9

10773. **Σ 2762.**

AC 1906.44 226°.2 57″.80 4*n* β^6

10775. **Σ 2763.** Probably fixed.

1906.35 293°.2 17″.05 2*n* β^6

10788. **Ho 151.**

1906.18 12°.3 1″.20 4*n* Doo 8.4...9.0

10846. τ *Cygni.* **A. G. Clark 13.**

1906.44 259°.9 0″.67 3*n* A

10926. **Σ 2789.** This is S 785. The principal star is Groombridge 3436:

Greenwich 0″.063 in 354°.2

10929. **β 839.** The proper motion of Groombridge 3435 is:

Greenwich 0″.032 in 68°.0

11032. **Σ 2803.** Evidently an error in the Harvard proper motion, as the value from the Greenwich positions of Groombridge 3476 is practically the same as that from the measures, 0″.025 in 80°.8.

11054. **Ho 288.** Apparently change from proper motion.

1906.72 278°.3 18″.60 3*n* β^6

11063. **Σ 2805** *rej.* The only measure is:

1906.61 323°.4 34″.97 2*n* β^6 8.4...10.0

11069. **H 3039.** No change.

1906.61 153°.9 11″.28 3*n* β^6 8.8...9.5

11075. **Hu 771.** The proper motion of Groombridge 3519 is given:

Greenwich 0″.020 in 107°.8

11083. **H 1661.**

1906.52 85°.7 11″.70 2*n* β^6 8.9...8.9

11084. **OΣ 442.** The proper motion is small:

Greenwich 0″.015 in 31°.4

11164. 75 *Cygni.* **A. C. 20.**

AC 1906.36 254°.4 56″.57 5*n* β^6

The five sets of measures by *Δ*, OΣ, HΣ and β give for the proper motion of A:

0″.067 in 67°.1

11182. **Σ 2819.** The proper motion of the principal star is:

Greenwich 0″.054 in 242°.6

11206. **See 456.** The place is erroneous. It is identical with No. 11180, the place of which is correct.

11222. κ *Pegasi.* **β 989.**

1906.49 111°.1 0″.24 3*n* A

11267. **Σ 2837.** This is Groombridge 3597; the proper motion is:

Greenwich 0″.048 in 162°.0

11285. **Σ 2832.** The proper motion of Groombridge 3578 is:

Greenwich 0″.033 in 111°.2

11297. **Ho 170.**

1906.66 168°.7 0″.27 4*n* Doo 7.7...7.7

11306. **Σ 2836.** The proper motion of Groombridge 3521 is:

Greenwich 0″.069 in 194°.7

11320. **OΣ 451.** The proper motion is:

Greenwich 0″.043 in 51°.1

11328. **H 3067.** The proper motion of Groombridge 3602 is:

Greenwich 0″.080 in 69°.6

11332. **Espin 143.** Error of 1ʰ R. A. in Espin.

1906.50 330°.1 7″.48 2*n* β^6 8.7...11.5

11333. **Espin 142.** Error of 1ʰ R. A. in Espin. There is a 13 m star, 266°.8 : 16″.0.

1906.50 37°.3 6″.19 2*n* β^6 8.5...13.5

11342. **H 1703.** The only measure:

1906.55 82°.4 9″.06 2*n* β^6 9.1...11.0

11357. **S 800.** The proper motions of these stars, Groombridge 3612 and 3613, are:

A = 0″023 in 5°2
B = 0.012 in 70.4

11473. **H 3088.** The only measure is:

1906.53 192°8 24″50 2*n* β^6 8.9...12.3

11474. **H 3089.** The only measure is:

1906.53 112°6 22″73 2*n* β^6 9.1...12.6

11582. **Σ 2883.** The proper motion of Groombridge 3719 is given:

Greenwich 0″065 in 283°4

11632. **H 961.** Probably fixed.

1906.56 288°4 17″16 2*n* β^6 9.0...11.5

11696. **Σ 2903.** The Greenwich proper motion is:

0″046 in 74°9

11725. **H 3114.**

1906.71 95°5 7″58 2*n* β^6 8.2...9.5

11732. **β 291.**

1905.84 172°8 0″34 2*n* A

11744. **H 3118.**

1906.71 297°2 33″10 2*n* β^6 7.0...10.6

11746. **H 3119.** The only measure is:

1906.47 93°3 35″94 2*n* β^6 8.0...12.2

11809. **Espin 105.**

1906.45 295°0 11″51 3*n* β^6 8.3...12.9

11816. **H 5345.** No motion.

1906.64 306°3 9″62 2*n* β^6 9.1...9.7

11839. 8 *Lacertae.* **Σ 2922.** Since Part II was in type Aitken has found that C has a close attendant:

C*c* 1906.58 257°8 1″55 2*n* A 9.5...14.2

D also has a companion about 10″ distant.

11843. **H 1790.** The only measure is:

1906.65 63°8 9″15 2*n* β^6 9.6...12.5

11854. **H 3126.** Distances discordant.

1906.65 355°9 22″82 2*n* β^6 8.6...10.3

11858. **Ho 479.**

1906.63 230°5 0″68 3*n* Doo 7.7...9.5

11874. **H 3128.** No change.

1906.60 226°3 10″89 1*n* β^6 7.3...10.5

11878. **H 1796.** The principal star, Groombridge, 3847, is given a small proper motion:

Greenwich 0″051 in 120°4

11932. **H 1804.** The only measure:

1906.60 341°8 22″80 2*n* β^6 9.0...13.0

11951. **Ho 481.**

1906.42 300°8 0″28 4*n* Doo 8.2...8.2

11965. **Ho 189.** No change.

1906.65 339°6 3″83 2*n* β^6

12069. **Σ 2959.**

AB 1906.60 105°7 12″75 3*n* β^6
BC 1906.65 92.5 10.59 2*n* β^6

12084. **Ho 484.**

AB 1906.56 97°5 3″38 1*n* β^6
AC 1906.62 215.3 40.20 2*n* β^6

12086. **O. Stone 58.** There is no double star of this kind in, or anywhere near, this place (1906.56). It may be identical with Σ 2935 (No. 11914).

12109. **H 1839.** The only measure is:

1906.54 295°3 14″48 2*n* β^6 8.6...10.8

12121. **Σ 2972** *rej.* This measure confirms the suspected change in angle.

1906.59 144°1 15″71 3*n* β^6

12143. 83 *Aquarii.* **A 417.** This close pair must be in very rapid motion:

1906.51 106°1 0″20 3*n* A

12158. **Espin 107.**
1906.54 219°5 5″25 2*n* β^6 9.2...12.1

12212. **H 3175.**
1906.63 71°8 14″77 2*n* β^6 9.1...10.8

12238. **Ho 299.**
1906.36 71°4 0″84 3*n* Doo 7.9...10.7

12284. **H 5393.** Probably fixed.
1906.62 302°7 19″20 1*n* β^6 8.2...10.5

12289. 95 *Aquarii.* **Ho 199.**
1906.53 203°1 1″00 1*n* A

12290. **β 80.** The motion in angle is now very rapid.
1906.52 163°8 0″18 2*n* A

12364. **Espin 108.**
1906.57 244°4 2″42 2*n* β^6 9.5...9.6

12404. **β 1266.** The motion is now very rapid.
1906.50 329°6 0″13 1*n* A

12421. **Espin 109.**
1906.58 45°4 5″80 2*n* β^6

12432. 72 *Pegasi.* **β 720.**
1906.50 173°6 0″36 2*n* A

12459. **Hn 58.**
1906.60 356°4 3″33 1*n* β^6

12480. **Espin 111.**
1906.57 11°9 3″52 2*n* β^6 9...12

12591. **H 3219.** Unchanged.
1906.62 344°7 10″40 1*n* β^6

12596. **ŌΣ 510.**
1906.54 154°0 0″38 1*n* A

12610. **Σ 3043.** Since Part II was in type, Aitken has found the principal star to be a close pair.
AB 1906.69 171°8 0″31 2*n* A 8.7...10.0
AC 1906.68 250.4 15.57 1*n* A ...9.5

12696. **Hn 60.**
1906.72 326°7 0″23 1*n* β^6

12701. 85 *Pegasi.* **β 733.**
1906.49 283°2 0″60 2*n* A

Bowyer and Furner, from the measures to 1904, find a period of 26.3 years. A discussion of the variations in the proper motion of A, as shown by the meridian observations and by the measures of the distant companion, gives nearly the same period for the close pair (*Mon. Not.* LXVI, 423).

Doberick (4110) from the measures to 1904 gives the period 25.36 years.

12747. **β 863.**
1906.58 124°8 1″71 2*n* β^6

12992. **Hu 1080.**
1906.00 256°9 0″47 2*n* A

13117. **A 1061.** Later measures of the close pair:
1906.22 319°1 3″31 2*n* A

13364. **Hu 1176.** Change in angle.
1906.33 90°4 0″14 3*n* A

13566. **A 883.** (AC = **Σ 2775.**) Apparently rapid motion in the close pair.
AB 1906.49 30°0 0″14 2*n* A